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UNITED STATES NAVAL ACADEMY

ANNAPOLIS, MARYLAND

CATALOGUE OF INFORMATION

1964-1965

Mission of the United States Naval Academy

To develop midshipmen morally, mentally and physically and to imbue them with the highest ideals of duty, honor and loyalty in order to provide graduates who are dedicated to a career of Naval Service and have potential for future development in mind and character to assume the highest responsibilities of command, citizenship and government.

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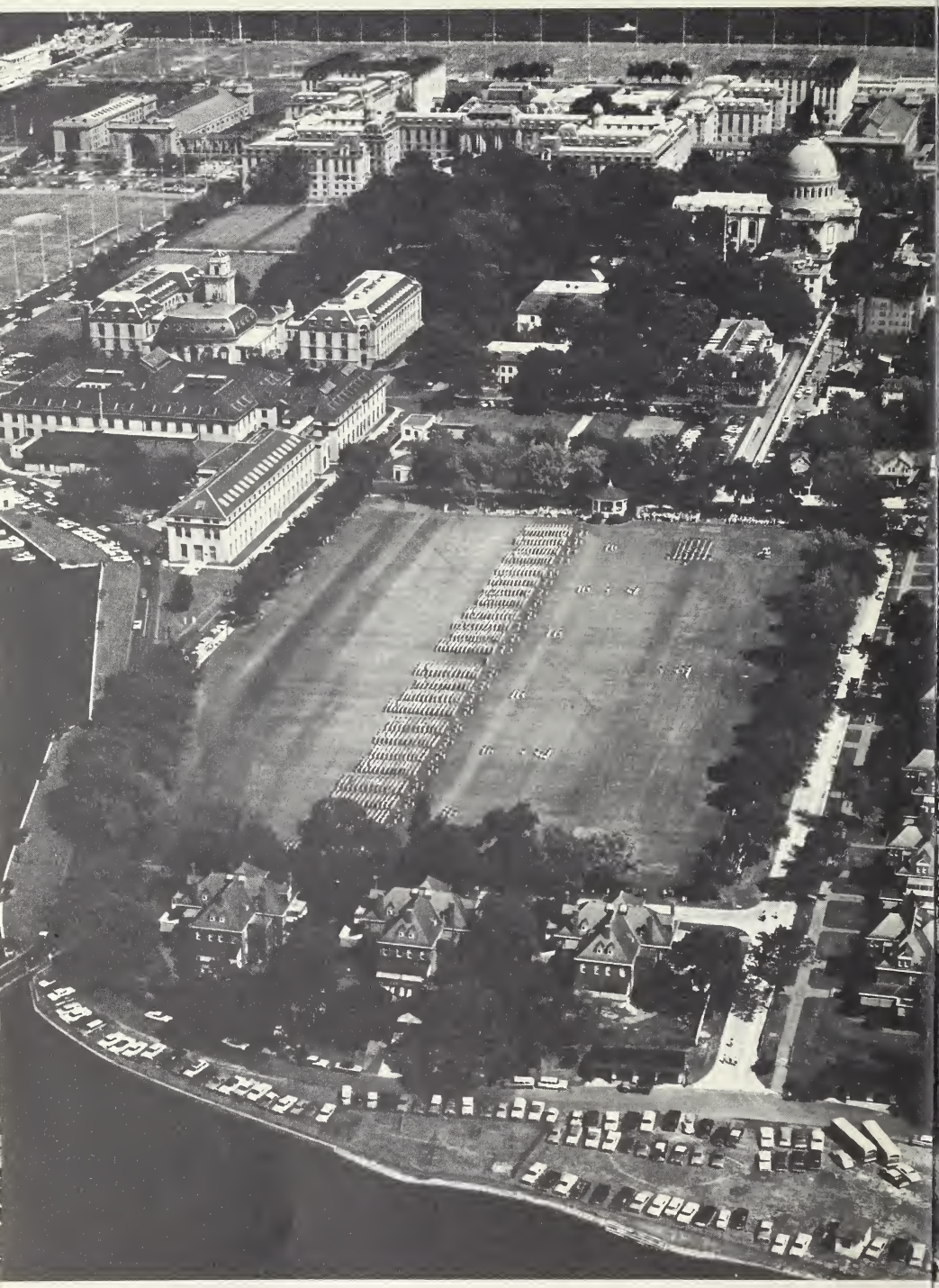


The U.S. Naval Academy

This is the Naval Academy

The U.S. Naval Academy is the undergraduate college of the U.S. Navy. It was established and exists to educate and train officers for the naval service. The Naval Academy is accredited by the Middle States Association of Colleges and Secondary Schools to award the bachelor of science degree. Graduates of its 4-year course are awarded this degree and are commissioned ensigns in the U.S. Navy or second lieutenants in the U.S. Marine Corps.

Located in Annapolis, historic capital of Maryland, the Naval Academy is 30 miles east of Washington, D.C., and 25 miles south of Baltimore. Visitors are welcome during daylight hours. Information and a map of the Academy can be obtained at any of the four entrance gates.

THROUGH THE YEARS—1845–1964

Before 1845 midshipmen of the U.S. Navy were educated aboard naval ships by the ship's chaplain. As the Navy changed from sail to steampower under the impact of the technological revolution in the 19th century, the knowledge of its chaplains became inadequate for the education of its officers. In 1803 a short-lived school was established at the Washington Navy Yard to supplement the customary training afloat. In 1839 a naval school was created at Philadelphia to give an 8-month course for midshipmen preparing for promotion examinations. Finally, in 1845 George Bancroft, the distinguished historian who was Secretary of the Navy in President Polk's Cabinet, obtained transfer of Fort Severn at Annapolis from the Army to the Navy as a site for establishing the present Naval Academy.

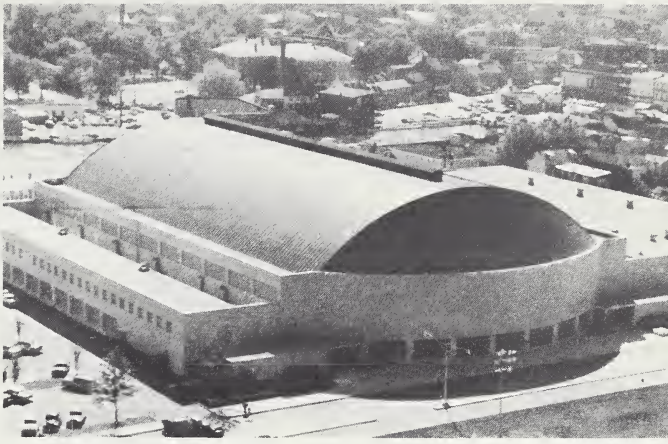
The first Superintendent of the Naval Academy was Comdr. Franklin Buchanan. His seven-man faculty of five officers and three civilians taught gunnery, naval tactics, engineering, chemistry, mathematics, astronomy, French, and English. About 60 midshipmen, formed in 2 classes, attended the Academy's first convocation held on Friday, October 10, 1845.

Except for the Civil War period, when instruction was temporarily transferred to Newport, R.I., the training and education of midshipmen has continued at Annapolis. The Academy survived the post-Civil War doldrums of the Navy, and since has repeatedly expanded to meet the demands of the Navy for more and better educated naval officers as the fleet grew and modernized to fulfill the Nation's growing need of seapower. By 1905 the Brigade of Midshipmen numbered 881. Old, outworn buildings were being replaced by the handsome, solid

Bancroft Hall, Midshipmen's Home at the Naval Academy

new structures which are a part of the Academy's physical plant today. As new building plans were drawn up, landfills in the Severn River expanded the Academy's grounds from an original 10 acres to their present 292 acres. The most recent landfill, completed in 1959, added 56 acres for athletic fields and new building construction. In the past few years, wings have been added to the midshipmen's dormitory, Bancroft Hall, to improve living conditions and to provide a brigade library and theater. A fieldhouse has been built primarily for indoor athletics but large enough to accommodate the entire Brigade and the families and friends of First Classmen (seniors) at graduation, and the Navy-Marine Corps Memorial Stadium has been constructed with privately donated funds on land near the Academy. A new science building is the first of a series of planned future improvements designed to provide adequate laboratories, classrooms, and libraries so that the Naval Academy can fulfill its obligations to the Navy and the Nation in the nuclear age.

A Moment of Silence in the Mess Hall



The New Field House

THE YARD TODAY

The Yard, as the Naval Academy grounds are called in Navy parlance, comprises 292 acres occupied by 219 major buildings and extensive drill and playing fields. The beautiful setting, where the Severn River opens into Chesapeake Bay, is admirably suited for training the midshipmen afloat and for inspiring them with the seaman's love of salt water.

Of all the buildings in the Yard, Bancroft Hall stands out as the center of midshipman activity. It houses the entire Brigade of about 4,000 men and provides most of their daily needs. Among its facilities are tailor and barbershops, a post office, medical and dental quarters, a soda fountain, a bookstore, recreation rooms, a tremendous galley for cooking the midshipmen's meals, and a vast messhall where the entire brigade is served in a single sitting.

Throughout the Yard stand monuments honoring naval heroes of

War Monument, Chapel in Background

The Chapel

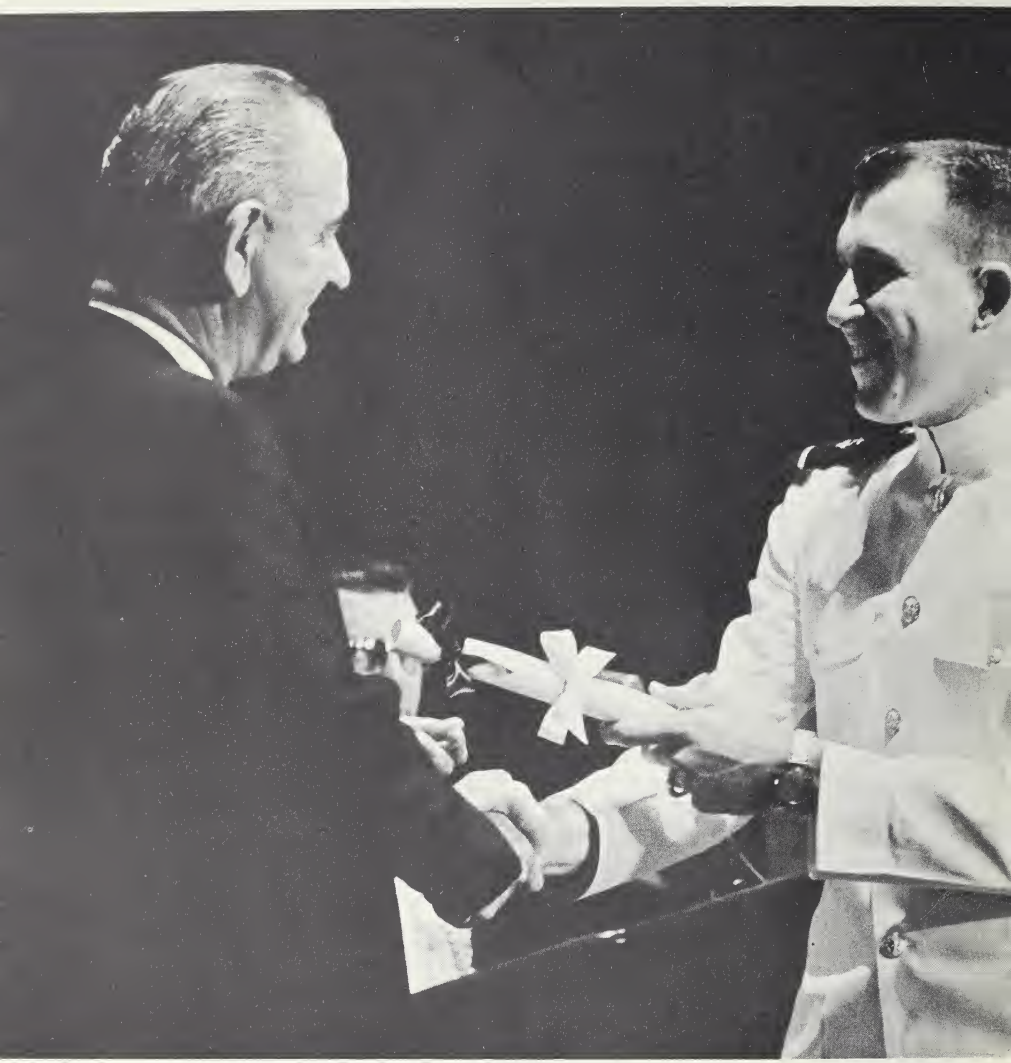
the past, helping to keep alive the Navy's traditions and spirit. In a crypt beneath the dome of the Chapel rests the sarcophagus of the celebrated Revolutionary War captain, John Paul Jones.

THE ACADEMIC REVOLUTION

Since 1959, the academic program of the Naval Academy has responded even more rapidly and profoundly than the physical plant to the demands of the nuclear age. The curriculum has been radically revised to offer courses relevant to the advanced technology of the ships and their equipment that the future officer will have to understand. Courses of instruction which directly support graduate study in the sciences or humanities have received special emphasis. Course content stresses general principles, which will be valid years hence, rather than concrete details, which may change. Methods of instruction encourage the student to show his understanding through classroom discussion rather than to learn by memorization. A new elective course program permits midshipmen to substitute elective courses of their own choice for courses in the regular curriculum whose requirements they

have met elsewhere before coming to the Academy and to supplement the regular curriculum with electives for which they have the ability and study time. The grading system has been changed from the old Navy system ranging from 0 to 4.0 with 2.5 as passing to the A, B, C, D, F system used by many civilian colleges and universities. This change is not only consonant with the improvements in curriculum, course content, and methods of instruction, which obviate the need for a 40-point grading scale, but also makes comparison of a midshipman's academic performance with that of students at civilian institutions much clearer. In line with the stress on academic performance, a small group known as Trident Scholars is selected for their high scholastic attainment from the First (senior) Class each year and excused from all regular curriculum requirements, including class attendance, to do independent work under the supervision of faculty advisers. Midshipmen are encouraged to compete for postgraduate scholarships of all sorts; in 21 years of competition, for instance, 19 Academy graduates have been selected to attend Oxford University as Rhodes scholars.

Sarcophagus of John Paul Jones in the Chapel Crypt



A Happy Graduate Receives His Diploma from a Former Vice President of the United States

The Academic Program

The 4-year academic program of the Naval Academy is undergraduate in scope and leads to the bachelor of science degree. The basic curriculum consists of 164 semester hours during the 4 academic years. About one-half of the instruction time is devoted to physical and engineering sciences, one-quarter to the social sciences and humanities, and one-quarter to naval science. The curriculum stresses basic and enduring principles to provide a background for effective leadership.

As a supplement to the basic curriculum, the Naval Academy offers a broad program of elective courses and provision for validation of college-level work successfully completed prior to admission. Qualified midshipmen may undertake advanced undergraduate courses in several major fields of concentration. The program thus provides all midshipmen with the educational benefits of the basic curriculum and at the same time provides opportunity for fuller development of individual talents. A complete listing of basic curriculum and elective courses by departments is given on pages 53 through. 102

The awarding of the bachelor of science degree to graduates of the Naval Academy is authorized by the act of Congress approved 25 May 1933, as amended by the act of Congress approved 8 July 1937. The degree is accredited by the Middle States Association of Colleges and Secondary Schools.

THE ACADEMIC ORGANIZATION

Responsibility for direction of the Naval Academy is vested in the Superintendent. This position is held by a naval flag officer. The Superintendent is assisted by the Commandant of Midshipmen, who is responsible for the administration and military and physical training of the Brigade of Midshipmen, and by an Academic Aide and a civilian Dean, who supervise the academic curriculum and standards. The Superintendent, the Commandant, the Dean, and other senior members of the faculty comprise the Academic Board, which makes major academic decisions and sets the academic standards of the Academy. There are eight academic departments: Engineering; Mathematics; Science; English, History, and Government; Foreign Languages; Command; Weapons; and Naval Hygiene.

THE FACULTY

When Commander Buchanan, first Superintendent of the Naval Academy, included three civilian teachers among his seven-man faculty, he founded a policy which has borne the test of more than a

A Navy Commander Instructs a Midshipman in Physics

century. Today the Naval Academy faculty, which has grown to 520, is still an integrated group of officers and civilians in about equal numbers. The officers, rotated at 3-year intervals, provide a continuing input of new ideas and experience from the Fleet. The civilians provide a core of professional scholarship and teaching experience as well as continuity to the educational program of the Academy. Well over 100 different colleges and universities in the Americas and Western Europe are represented by the backgrounds of the Academy faculty. Most officer faculty members are naval officers, but all the Armed Forces are represented; foreign officers also serve through exchange programs to instruct in their native languages and to provide midshipmen an early insight into the international aspects of naval life.

A Civilian Professor Conducts a Seminar

A policy of assigning the best qualified instructor for the specific course determines the distribution of the officer and civilian faculty among the academic departments. For example, the naval science departments are staffed largely by officers, whereas civilian instructors are in the majority in the social sciences and humanities departments.

Members of the Naval Academy faculty participate in local and national meetings of educational and professional societies. As advisers and coaches, they work closely with the midshipmen in their extracurricular activities. As scholars, they contribute to the literature of their specialties, prepare texts for midshipman instruction, and conduct research projects in this country and abroad.

A complete listing of the Naval Academy faculty by academic departments is given on pages 108 through 125.

A Marine Captain Explains a Gunnery Problem

THE SCHEDULE OF INSTRUCTION

The calendar year for each Naval Academy class is divided into two semesters and a summer term. The academic year consists of the first and second semesters, each semester generally consisting of 17 weeks of instruction and 1 week of examinations. Midshipmen generally carry about 20 semester hours of academic courses. The normal academic routine provides for 5½ days of recitations, lectures, laboratory periods, and drills each week. Academic days are divided into 7 periods of 50 minutes, Monday through Friday, and 4 periods on Saturday morning. During the seventh period, the Brigade participates in military drill on Monday and a dress parade on Wednesday

in the fall and spring. Some elective courses are taught the 7th period on Tuesdays, Thursdays, and Fridays. A 2½-hour evening study period is provided every evening except Saturday. Some periods during the day are also allocated to study.

The instructional unit is a *section* of about 15 midshipmen. These small sections give each midshipman an opportunity to ask questions and to take an active part in classroom discussion. The high ratio of instructors to students (about 1 to 10) makes it possible usually to assign only three or four sections to an instructor. Consequently individual attention is characteristic of education at the Naval Academy.

THE BASIC CURRICULUM

Every midshipman must take the basic curriculum, except those courses which he can validate as noted below under "Advanced Placement Program." The basic curriculum is designed to give the midshipman the essential education in science, engineering, social science, the humanities, and naval science that he will need to perform effectively as an officer in the U.S. Navy. The courses of the basic curriculum and the semester hours allotted to each are listed by class year.

Fourth Class Year

First Semester		*Semester hours*	*Second Semester*		*Semester hours*
M103	Analytic Geometry and Calculus	5	M104	Analytic Geometry and Calculus	5
S101	Chemistry	4	S102	Chemistry	4
E105	Engineering Drawing and Descriptive Geometry	3	E106	Statics	2
H101	Composition and Literature	3	H102	Composition and Literature	3
L101	Foreign Language	3	L102	Foreign Language	3
T101	Physical Education	1	C104	Shipboard Orientation and Fleet Operations	¾
X101	Executive	1	T102	Physical Education	1
			X102	Executive	1
	Total	20			19¾

Third Class Year

First Semester		*Semester hours*	*Second Semester*		*Semester hours*
M205	Analytic Geometry and Calculus	5	M202	Mechanics	5
S201	Physics	5	S202	Physics	5
E203	Strength of Materials	3	E204	Engineering Materials	3
H201	Modern European History	3	H202	U.S. Foreign Policy and Geography	3
L201	Foreign Language	2½	L202	Foreign Language	2½
T201	Physical Education	¾	C204	Seapower	¼
X201	Executive	1	T202	Physical Education	¼
			X202	Executive	1
	Total	20¼			20

Second Class Summer

		Semester hours
C300	Air-Ocean Environment and naval tactics	2
W300	Digital Computers	¾
E300	Ship Hydrostatics (buoyancy and stability)	½
H300	Speech	¾
	Total	4

Second Class Year

First Semester		*Semester hours*	*Second Semester*		*Semester hours*
M303	Differential Equations	3½	S304	Electromechanics	3¾
S303	Circuit Analysis	3	E306	Fluid Mechanics I	4
E305	Thermodynamics I	4	H302	Economics	2¾
H301	United States Government	2	C306	Introduction to Military Psychology and Management	2½
C301	Piloting and Navigation	3½	C308	Navigation	3
W305	Terminal Ballistics	2¼	W306	Target Intercept Analysis	2¼
T301	Physical Education	½	T302	Physical Education	½
X301	Executive	1	X302	Executive	1
	Total	19¾			19¾

First Class Year

First Semester		*Semester hours*	*Second Semester*		*Semester hours*
S403	Electronics I	3	S404	Electronics II	4
E405	Fluid Mechanics II	3	E406	Thermodynamics II	3
H401	Naval History	3½	H402	Advanced Composition and Literature	3¾
C407	Case Studies in Leadership and Military Law	2½	C414	Naval Operations II	4½
C411	Naval Operations	3¾	C408	Meteorology	1
W407	Elements of Weapons Systems Dynamics	2½	W408	Weapons Systems Analysis and Synthesis	2½
Y401	Naval Hygiene	¾	T402	Physical Education	½
T401	Physical Education	¼	X402	Executive	1
X401	Executive	1			
	Total	20¼			20¼

THE ADVANCED PLACEMENT PROGRAM

Midshipmen are allowed to omit courses in the basic curriculum which are substantially the same as courses they have satisfactorily completed elsewhere before coming to the Naval Academy. This privilege, called validation, is granted on the basis of review of previous scholastic records and examination by the department which gives the course for which validation is sought. *Candidates are encouraged to submit College Entrance Examination Board Advanced Placement test results as substantiation for validation.*

Midshipmen who validate courses in any department normally take the other basic curriculum courses of that department consecutively in regular order. After they have fulfilled the course requirements of that department, they fill the remaining vacant semester hours allocated to that department by taking alternate elective courses in that or some other department. Each validating midshipman is assigned a faculty adviser to assist him in planning a profitable and acceptable pattern of elective courses.

THE ELECTIVES PROGRAM

Midshipmen of the three upper classes and of the Fourth Class during their second semester who meet certain scholastic eligibility requirements are permitted to enroll in one or more elective courses in addition to the courses in the basic curriculum and alternative elective courses they may have substituted for basic curriculum courses.

MAJOR AREAS OF STUDY

Although each midshipman must complete the basic curriculum, it is possible for him to embark on a concentrated field of study. Through judicious choice of electives, major programs may be undertaken in mathematics, marine engineering, aeronautical engineering, engineering, engineering science, mechanical engineering, nuclear science, chemistry, physics, history, social science, foreign language, literature, and weapons system engineering.

TRIDENT SCHOLARS

Under the Trident Scholars program, a small number of exceptional students are permitted to pursue independent research, supplemented by such regular curriculum and elective courses as they desire, in their First Class (senior) year. Class attendance is not required, and travel in connection with research is fully supported for Trident Scholars. Each Trident Scholar is assigned a faculty adviser to coordinate and supervise his program. Monthly formal meetings of

Foreign Officer Instructors in Modern Languages

all scholars and advisers provide the vehicle for reporting and monitoring the progress of research. The Trident Scholar prepares and submits a thesis on his research project as the basis for his First Class academic grade.

THE LIBRARY

The Naval Academy Library, under the direction of a professional librarian, provides all of the resources of a college library in support of the academic program. In addition to basic reference works and primary source materials in such fields as history, literature, and science, it incorporates the latest authoritative works in all fields of knowledge. It is especially well furnished with military source materials and periodicals and has assembled one of the largest collections of naval books, periodicals, and related materials in the United States.

The Main Reading Room of the Naval Academy Library

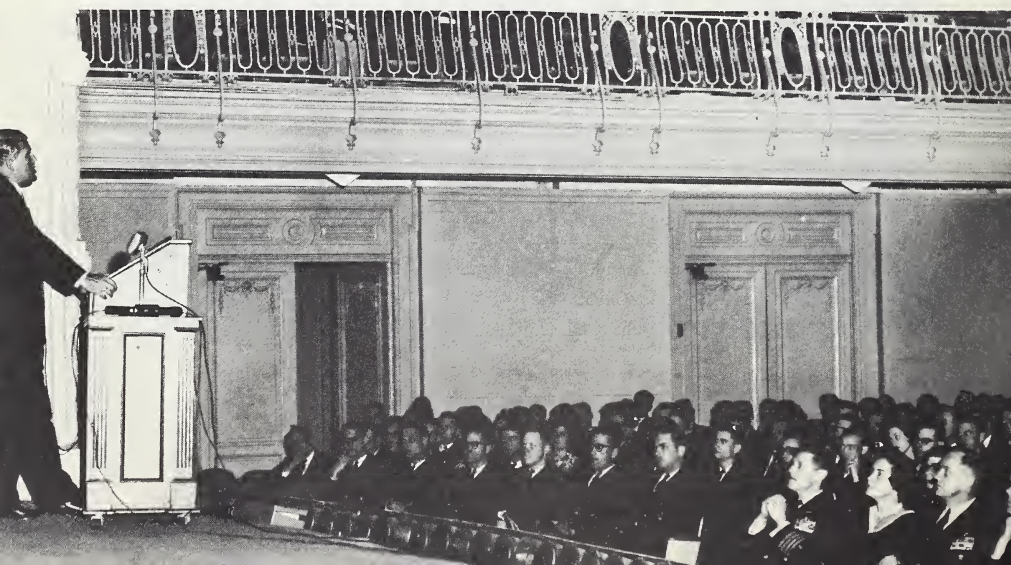
Research in the Brigade Library, Bancroft Hall

Midshipmen of all classes make important use of the Academy Library. Themes and reports are frequently based on library research. The English, History, and Government Department requires all First Class midshipmen to submit a substantial library research paper.

THE EVENING LECTURE PROGRAM

Midshipmen of the First Class are afforded an opportunity to broaden their outlook as educated citizens through an evening lecture program. The fine arts, world affairs, and those sciences which do not directly touch their profession (anthropology, archeology, and geology for instance) are the subjects of talks by inspiring lecturers preeminent in their fields. The 1963–1964 series featured such personalities as Prof. John Ciardi on poetry, Mr. Nicholas Katzenbach, Deputy Attorney General of the United States, Dr. Wernher von Braun on space, and Dr. Howard Mitchell on music.

Dr. Wernher von Braun Addresses Potential Astronauts

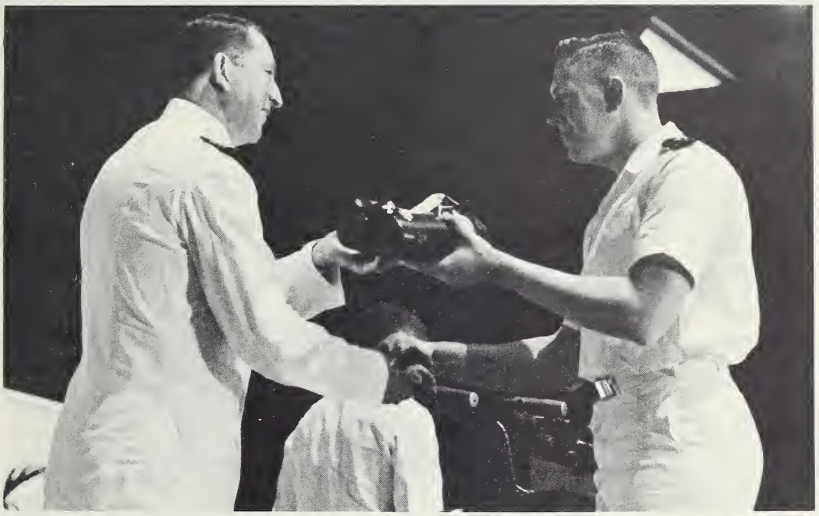


PRIZES AND DISTINCTIONS

Each year more than 50 prizes and awards are presented to midshipmen for outstanding accomplishments in academic work, for marked proficiency in professional departments, or for excelling in contests of knowledge about such matters as world history of the present day and in debate and public speaking.

Prizes normally consist of selected items which will be useful in a professional or personal way upon graduation. In some cases the prize or award is specified by the donor but in many the choice of a prize, within certain limitations, is left with the recipient.

These prizes and awards are provided by national patriotic organizations and societies, by former Naval Academy classes, by or in behalf of outstanding leaders in military and civilian life, as memorials to

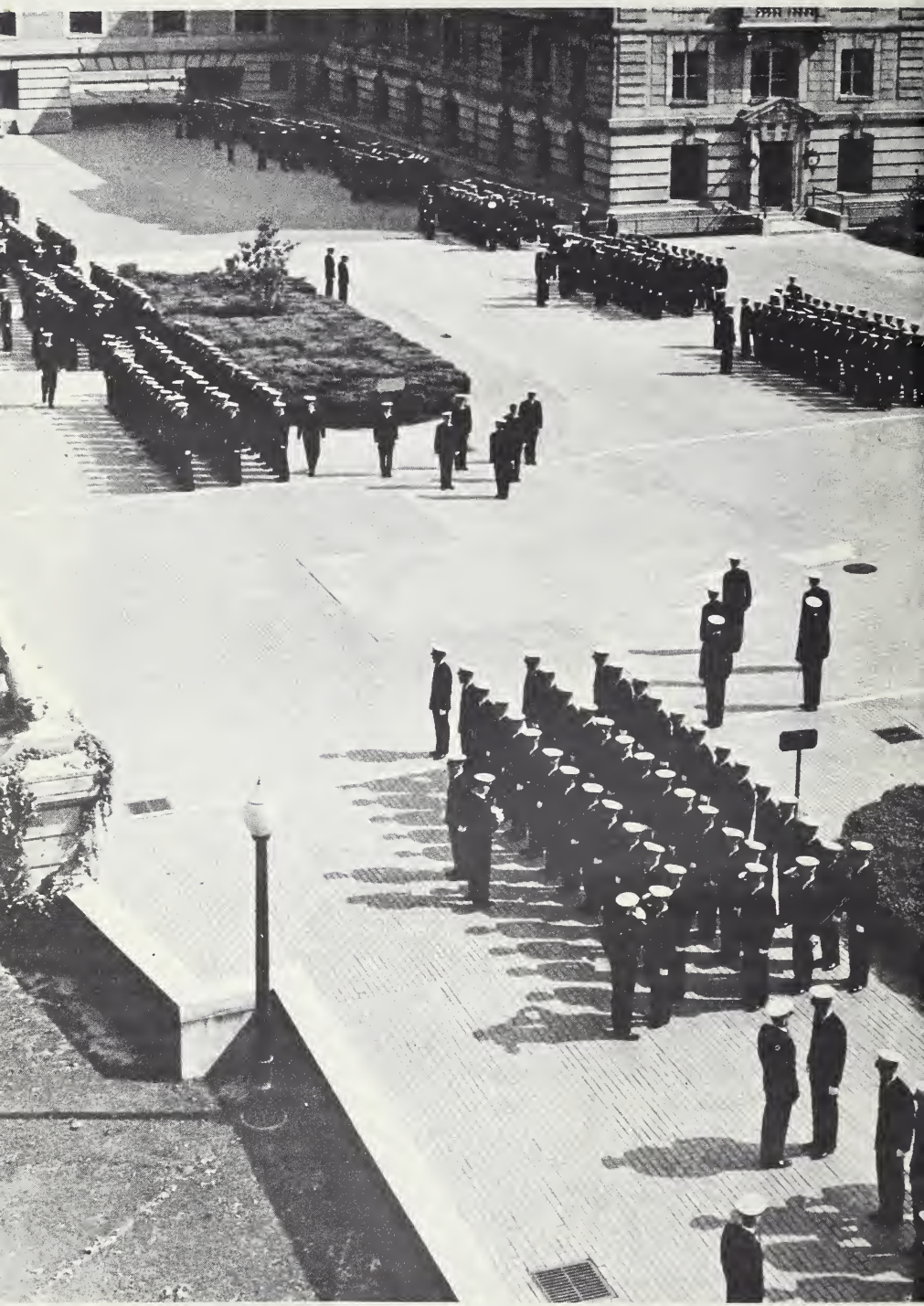


A Nautical Prize at Graduation

deceased graduates, and by organizations recognized widely in some field of activity or endeavor with a direct or indirect naval association or affiliation.

One of the more noteworthy distinctions which can befall a member of each graduating class is to be a recipient of a letter of commendation from the Superintendent. This high honor is conferred on midshipmen who have demonstrated outstanding officerlike qualities and who have contributed most by precept and example to the development of those qualities within the Brigade of Midshipmen.

Appropriate awards also afford recognition to those who excel in athletics and who participate in the many extracurricular activities which help to broaden and enrich the lives of the members of the Brigade of Midshipmen.



Noon Meal Formation

The Military Program

The Naval Academy differs materially from most other institutions of higher learning because it has a more comprehensive mission. As a college designed to produce naval officers, it offers not only a sound academic education but also a physical and military training program as a foundation upon which a successful naval career can be built. Consequently midshipmen live in an atmosphere considerably different from that of the average college. Their life is a disciplined, military existence with few of the freedoms normally available to college students. Midshipmen have a full and demanding schedule which is designed to develop to the fullest their mental, moral, and physical capacities. The ultimate goal of this system is to produce an educated leader of firm character, physically sound, and dedicated to the service of his country.

THE BRIGADE OF MIDSHIPMEN

The Brigade of Midshipmen numbers about 4,000. It is divided into 2 regiments, each regiment into 3 battalions, and each battalion into 4 companies. The 24 companies are the basic administrative units. The Brigade is headed by a midshipman Brigade Commander, and each of its subdivisions also has an appropriate midshipman officer. Midshipmen stand watch, as aboard ship, and exercise leadership in both the military and administrative activities of the Brigade as a vital part of their training.

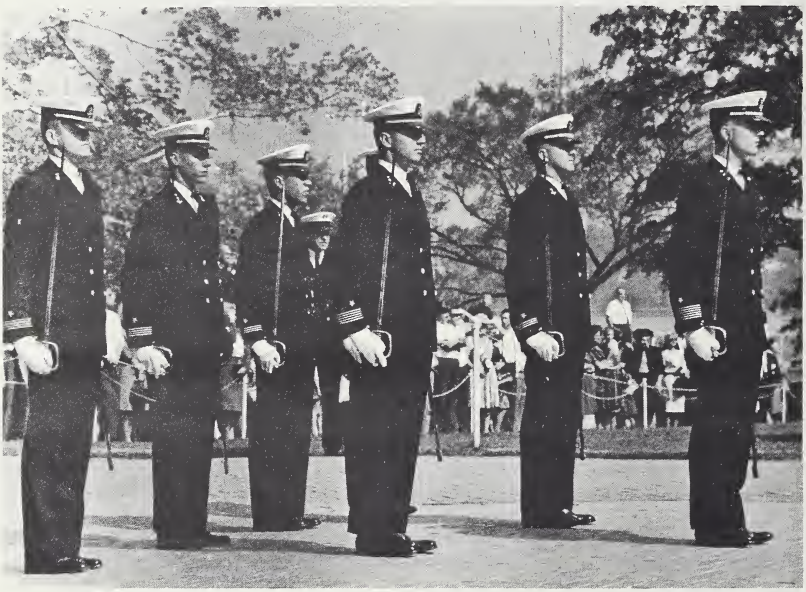
The entering class is designated the Fourth Class, and its members are colloquially known as "plebes." Upon completion of their initial year, plebes become Third Classmen, or "youngsters." The next year youngsters become Second Classmen. In their last year at the Naval Academy, midshipmen are First Classmen. Each company is made up of members of all four classes in proportion to the size of the class.

Color Parade, a Highlight of June Week

FOURTH CLASS INDOCTRINATION

During his first year at the Naval Academy, the plebe will be exposed to an exacting program of inspection, instruction, and correction known as "Plebe Indoctrination." The objective of this system is forthright, demanding, and far reaching. Its aim is the rapid development of the attributes required of a naval officer. It is a positive and constructive program oriented to influence the lives, habits, and character not only of plebes but of all midshipmen.

Plebe Year is designed to accomplish the necessary transition from the civilian to the military way of life. The new midshipman, through precept and example, will have inculcated in him the standards of performance required of a naval officer. Additionally, Plebe Indoctri-



Midshipman Officers of the Brigade Staff

nation strives to increase the midshipman's professional knowledge and formal education and to inculcate proper study habits. Plebe Year is traditionally tough—not by accident but by design. This is a period of testing, a time to separate the performers from the non-performers. It requires midshipmen to produce under pressure, to stand on their own two feet, to respond instantly and reflexively to orders, and, finally, to meet the highest standards of conduct, honor, character, and morality. Although the Plebe System is run and administered essentially by the midshipmen of the First and Second Classes, it is closely monitored and supervised by officers.

During his first year, the plebe becomes familiar with navy life and learns its customs and traditions. He is expected to participate

in intramural sports and become active in as many extracurricular activities as his studies will allow.

THE MIDSHIPMAN'S LIFE

The life of a midshipman is an active one. He follows a well-planned routine from the time he rises in the morning until he goes to bed at night. It is the strict discipline of this routine which distinguishes the Naval Academy from most other colleges.

During the academic year a midshipman's day begins at 6:15 a.m. He rises and prepares himself for breakfast formation, 30 minutes later. After breakfast he begins a day of study, recitations, drills, and labora-

Formal Hops are Always Popular

tory work. When the academic work is completed at 3 or 4 p.m., he will usually participate in sports or extracurricular activities until evening meal formation at 6:30 p.m. After the evening meal and a brief period of relaxation, he returns to his studies for the remainder of the evening. "Taps" sounds at 10:20 p.m., but studies may continue under specified conditions.

At noon on Saturday the Brigade completes the academic work for the week. Saturday afternoon will find the midshipmen enjoying "liberty" in Annapolis or attending the many intercollegiate athletic contests or participating in them. On Saturday night a dance, or "hop," is usually planned by one of the three upper classes. Motion

pictures are shown for all midshipmen on Saturday night, and on Sunday afternoon the three upper classes may escort guests to these movies.

On Sunday morning the midshipmen attend services at the Naval Academy Chapel or at the church of their choosing in the city of Annapolis.

Sunday Service in the Chapel

When summer comes, midshipmen of the new First and Third Classes embark on cruise. The summer program gives them an opportunity to apply the knowledge and techniques they have acquired at the Naval Academy to duties in engineering, gunnery, navigation, communications, aviation, and tactics. They learn at first-hand the duties of seamen and petty officers as well as those of junior officers. They gain increased knowledge and a wider understanding of the Navy. In visits to foreign ports they enjoy seeing the land and meeting America's friends and allies. At the end of cruise midshipmen receive 30 days leave of absence from the academy before beginning the new academic year.

Embarking for Summer Cruise

Plebe Summer Instruction on the Rifle Range

Meanwhile the members of the new Fourth Class spend the summer at the Naval Academy. While the Second Classmen are engaged in aviation indoctrination and a four-week academic program, the Plebes are trained to prepare them for taking their place in the Brigade when the other classes of midshipmen return in September.

LEAVE AND PRIVILEGES

The amount of personal freedom and privilege granted a midshipman varies directly with his seniority and the degree of his authority and responsibility. A First Classman (Senior) will have not only more responsibility in the administration of the Brigade but also more privileges. Midshipmen proficient in academic work and military aptitude also are rewarded with extra privileges.

There are several regular periods of leave of absence from the academy for all classes during the academic year. These are Christmas leave, a period of about 2 weeks; end-of-term leave, a 3-day weekend break at the end of the first term in January; spring leave, a period of 3 days usually in late March; and the month-long summer leave at the completion of the summer training program.

In addition to leave of absence, midshipmen are granted recreational freedom in the Annapolis area. This privilege is called liberty. Like all other privileges, it varies with seniority and responsibility. Fourth Classmen are permitted liberty on Saturday afternoons and dining-out privilege with relatives and close friends on Saturdays and Sundays. They are permitted to escort young ladies on three occasions during their first year. First Classmen have liberty after classes every day unless duties prevent. They are also granted three weekend liberties each semester.

Bill the Goat, Navy Mascot, Memorialized in Bronze

Navy All-Americans

The Athletic Program

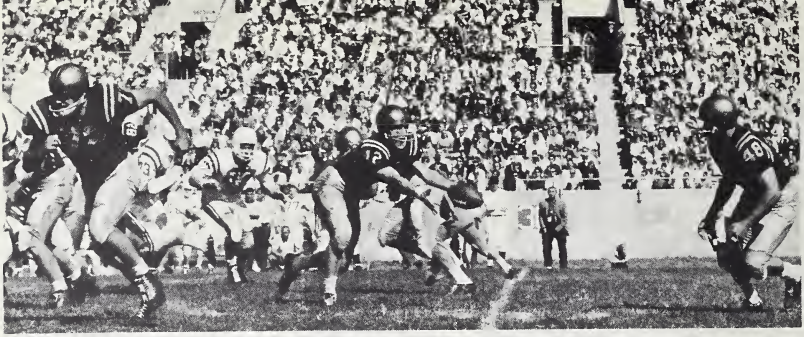
Every athletic appetite can be satisfied by the diversified intercollegiate and intramural sports program at the Naval Academy. It is probably the largest such program at any major institution in the Nation.

The activity sprawls over 101 acres of playing field, spills onto the gridiron of the Academy's modern 29,000-seat Navy-Marine Corps Memorial Stadium, reverberates throughout the cavernous Naval Academy Field House, and occupies an abundant array of tennis, squash, handball, and badminton courts.

The multisided program is open to all midshipmen. Every young man at the Academy is obliged to participate in some way. In this manner the Naval Academy fulfills the "physical" portion of its three-pronged mission.

INTERCOLLEGIATE ATHLETICS

Twenty-one varsity squads represent Navy in intercollegiate competition throughout the country. During the fall, winter, and spring

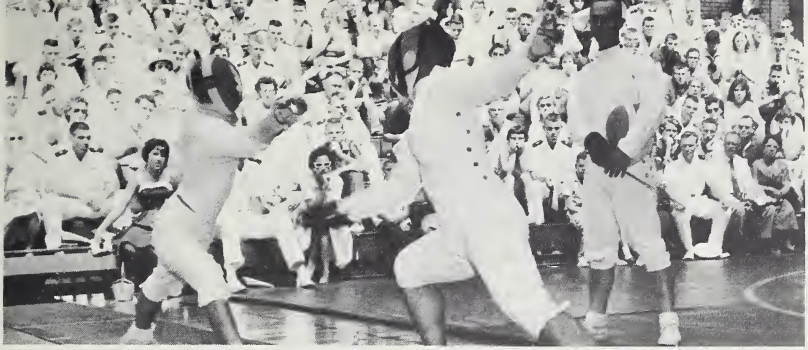


seasons, Navy teams are active carving a record of achievement which can be equaled by few institutions.

In the athletic year 1962–63, for instance, the Naval Academy's varsity teams won 129, lost 60, and tied 1, in action with other schools.

Two squads finished their seasons undefeated, while five other teams won or tied for championships. In 1964 Navy had 9 All-Americans representing 8 different sports.

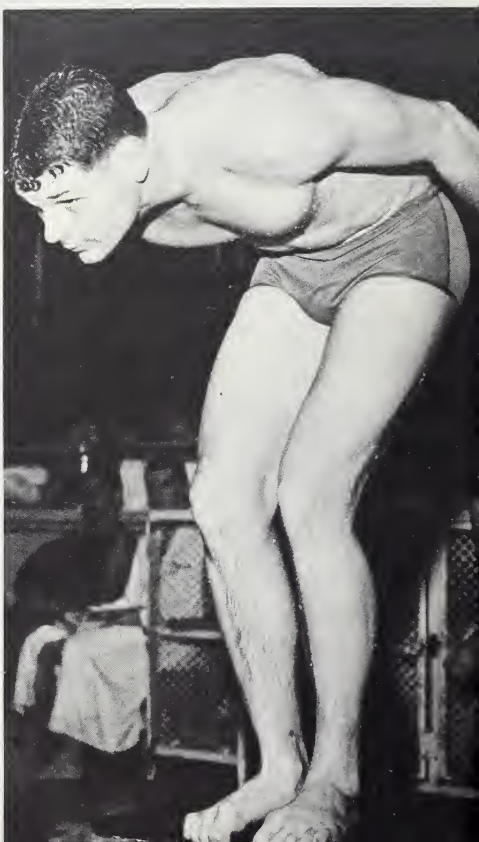
The intercollegiate program encompasses the following sports:



Baseball, basketball, crew (heavyweight and lightweight), cross country, fencing, football (varsity, junior varsity and lightweight), golf, gymnastics, lacrosse, pistol, rifle, sailing, soccer, squash, swimming, tennis, track, and wrestling.

Fall Sports

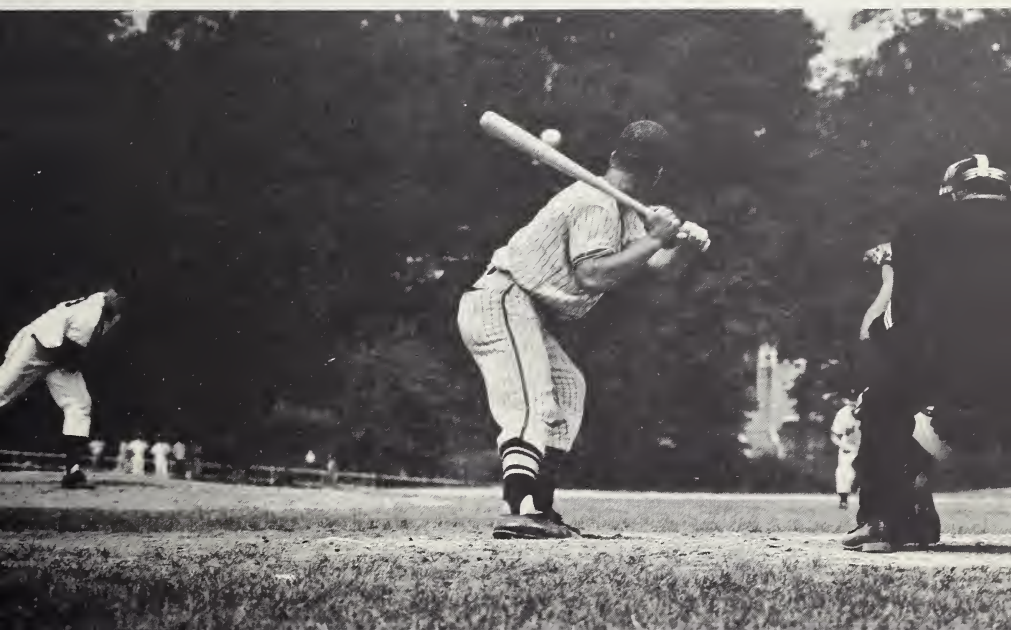
Football, of course, is king in the fall. Navy teams are always interesting and exciting with a fast and lively style of attack. The big GAME of the season is always the meeting with arch-rival Army

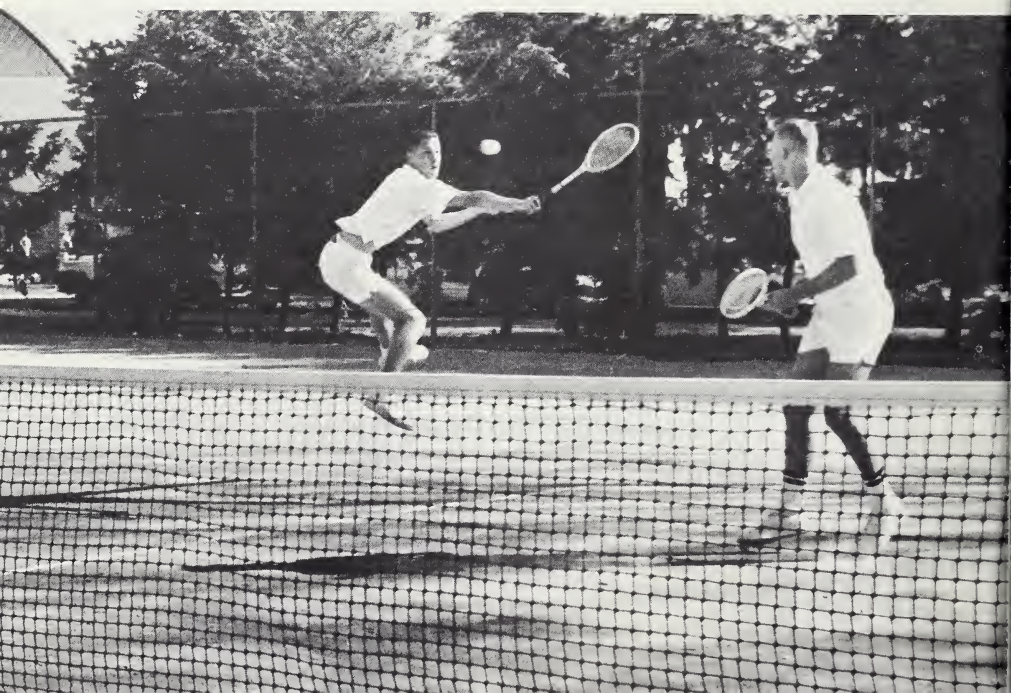


before the usual 100,000 spectators in Philadelphia. Navy, however, plays to sellout audiences across the entire country. The grid program is not restricted to a varsity eleven. Midshipmen can also compete for sports on the 150-pound squad, the junior varsity team, or a plebe (freshman) outfit.

Two sports demanding the utmost of conditioning—soccer and cross country—share the autumn spotlight with football. Cross-country races are normally run over a 5-mile course. An unusual scoring system awards victory to the team compiling the fewest points. Soccer requires an aptitude for clever footwork. Navy's soccer record has been outstanding in recent seasons. The 1963 team participated in the NCAA soccer tournament, taking second place in the Nation.

Dinghy sailing is a sort of hybrid in so far as seasons go. The sailors sail an intercollegiate schedule in both the fall and spring.





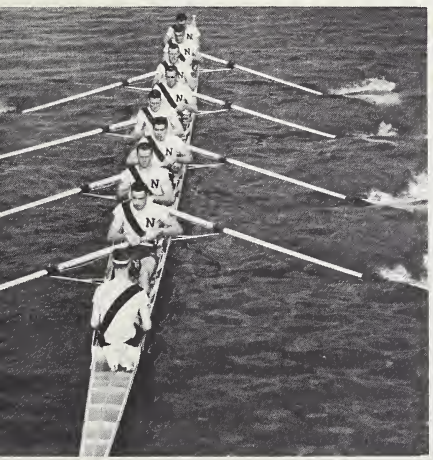
Winter Sports

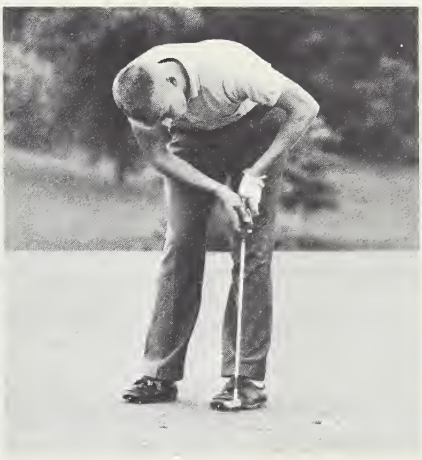
An ambitious program of nine sports keeps the athletic heat torrid during the winter months. From swimming pool to wrestling loft, midshipmen are busy challenging the top collegiate opponents.

Navy basketball has enjoyed unparalleled success since the sport came to the banks of the Severn in 1906. In all of that time the midshipmen have had only two seasons in which Navy lost more games than it won.

In fencing, Navy has won more collegiate titles than in any other single sport. Navy was last NCAA champion in 1962.

Gymnastics, rifle, pistol, squash, swimming, track, and wrestling offer other outlets for the interested young man. In each of these sports, expert coaching, excellent facilities, and the finest of equipment are available.





Spring Sports

Springtime moments can be devoted to any one of seven sports. Navy plays its home baseball games in the 5,000-seat Lawrence Field. The Middie nine competes in the Eastern Intercollegiate Baseball League, which includes the Ivy League schools, Army, and Navy.

Lacrosse is a challenging sport played by over 70 colleges in the United States. Navy teams excell in this old Indian game, which draws enthusiastic crowds throughout the State of Maryland.

Three shells—varsity, junior varsity, and plebe—are open in both heavyweight and lightweight crew programs. Oarsmen with talent can win a seat and perhaps a trip to the Olympics. Navy was the Olympic champion in 1952.

Golf and tennis are two recreational pursuits that can give enjoyment even in later years after graduation. A 6,217-yard golf course is open to midshipman play as well as blocks of tennis courts. Outdoor track and dinghy sailing complete the roster of spring sports.

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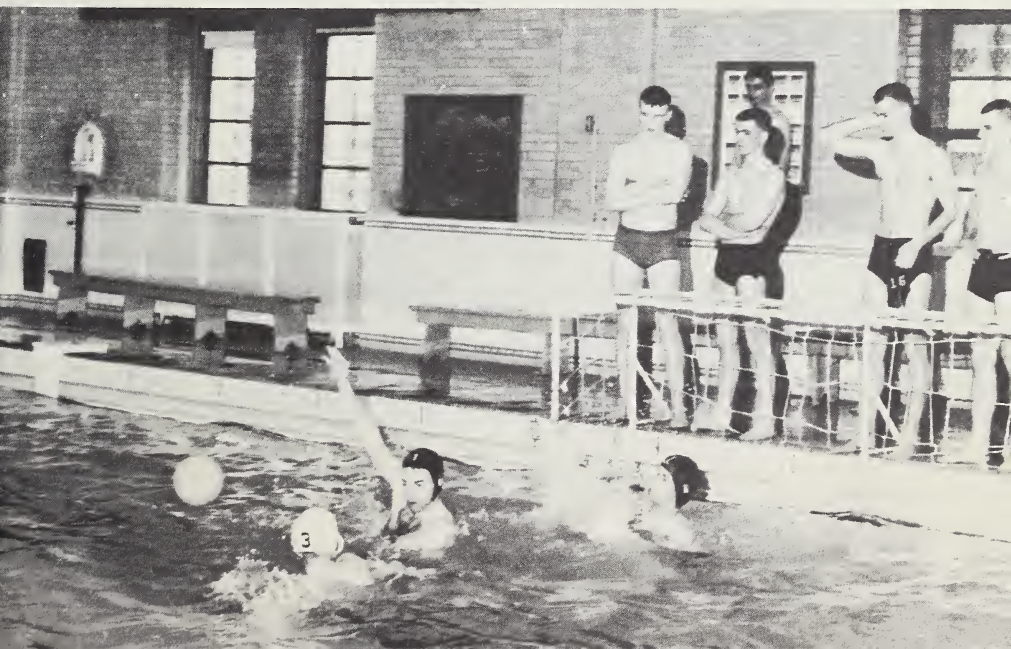
INTRAMURAL SPORTS

All midshipmen not on organized teams are required to take part in intramural sports. In intramurals they can compete with others possessing comparable athletic ability in a particular sport and enjoy an opportunity for physical development and recreation. The intramural sports program of the Physical Education Department comprises the following 24 different sports:

badminton	football	swimming
basketball	gymnastics	tennis
boxing	handball	touch football
bowling	lacrosse	track
crew	rugby	triathlon
cross country	soccer	volley ball
fencing	softball	water polo
field ball	squash	wrestling



Luders Yawl—A Bright Day with Spinnaker flying

The Sailing Program

Training under sail at the Naval Academy develops team discipline, leadership, and appreciation of the sea and ships. In an age of nuclear power, moral courage and resourcefulness are more than ever needed in men at sea. Ship handling and basic deck seamanship are still factors to be counted in bringing any ship into port, whether she be powered by sail or nuclear reactor. The sail training program at the Academy fosters each of the aforementioned qualities and skills.

In this program the Academy uses one of the finest small craft facilities in the world as well as some of the best known boats in

Schooner *Freedom*—Midshipmen and faculty family sailing

ocean racing circles. The sailing fleet ranges from the 88-foot schooner *Freedom* through the 50-foot yawls *Annie D* and *Gypsy* to 14-foot Gannett sailing dinghies. The Academy's 71-foot yawl *Royono* was first to cross the line in the 1952 Newport-Bermuda race, and its 62-foot cutter *Highland Light* was holder of the record for elapsed time in that ocean racing classic for 22 years. All midshipmen are given 12 hours' training in the Academy's fleet of 30 knockabouts (26-foot single-masted craft) and 8 hours training in its twelve 44-foot Luders yawls. Its 30 Gannett dinghies and Shields sloops are used for advanced training and intercollegiate competition.

Midshipmen gain competitive experience during the school year with the larger boats on the Chesapeake Bay in open competition and with the 44-foot Luders yawls, 30-foot Shields sloops, and 14-foot dinghies in one-design intercollegiate and intramural contests. The Naval Academy varsity dinghy sailing team is among the best in the country, having placed three of its members in the 1960 Olympic Finn monotype eliminations. During the summer the larger boats are sailed on the open sea in the Bermuda and Annapolis-Newport ocean races as a postgraduate sailing exercise.

Sail training beyond the primary stages is administered by the Naval Academy Sailing Squadron, an organization of officers, faculty, and other personnel of the Severn River Naval Command interested in contributing to the welfare and success of Academy sailing. Advanced sail training is voluntary. About one-quarter of the Brigade of Midshipmen participate beyond primary training in competitive and recreational sailing. In addition to conducting this advanced training, the Naval Academy Sailing Squadron serves as a liaison with the sailing fraternity everywhere. Thus sailing at the Academy not only gives a midshipman vital insight into the nature of the sea but also is his first experience in carrying the spirit of the Navy to other ports.

Dinghies Rounding the Buoy

Midshipman Publications: *Trident*, a Professional Magazine; *The Log* for Lighter Moments; *Lucky Bag*, The Year Book; *Splinter* for Laughs

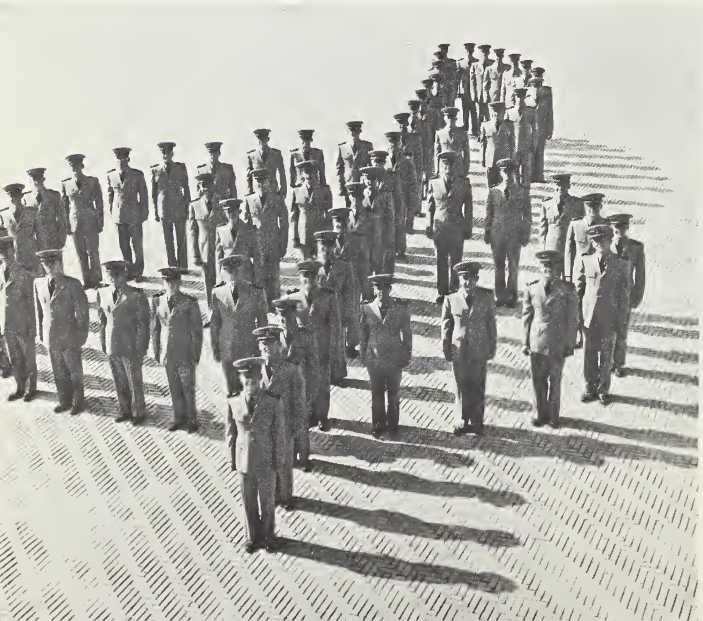
The Extracurricular Program

As a leisure time pursuit or to develop special interests, a midshipman may choose among some 40 extracurricular activities. Publications, musical organizations, dramatics, and hobbies of a professional and nonprofessional nature are all available, usually in a variety of forms.

The Antiphonal Choir

The Concert Band

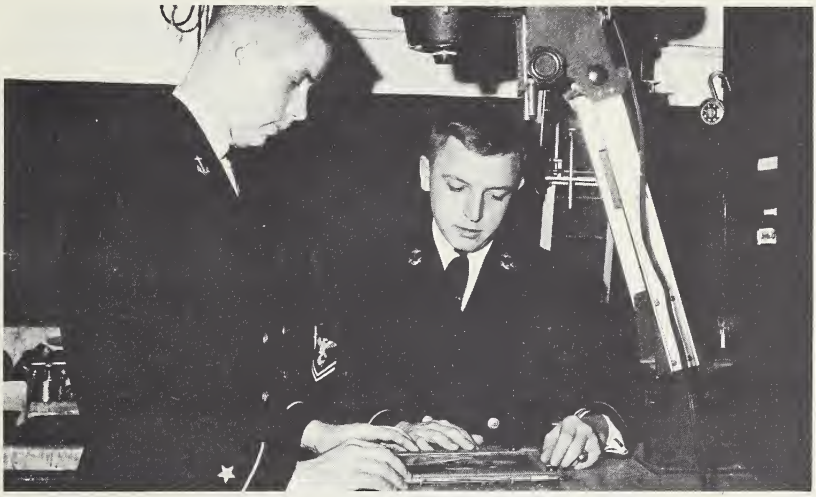
The Drum and Bugle Corps



The Glee Club

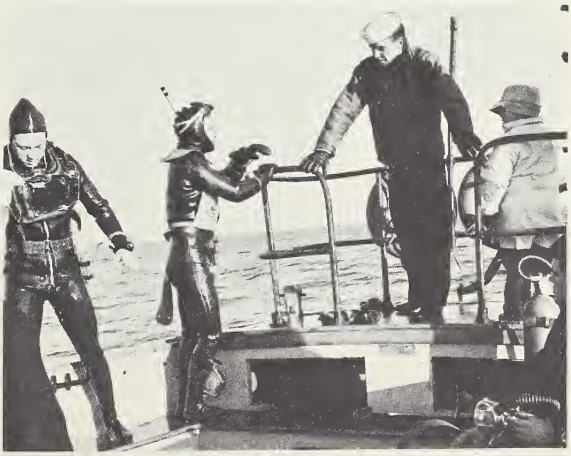
Midshipmen's Radio Station, WRNV

Dramatic Society



The Photography Club

The Scuba Club



Finances

ENTRANCE DEPOSIT

To defray part of their initial outfitting cost, candidates upon admission to the Naval Academy must deposit the sum of $300. (Reductions are made in cases of extreme hardship down to $100 minimum.) In addition, the Government advances $600 for the outfitting. This advance constitutes an obligation against the individual midshipman's pay account which is liquidated at the rate of $20 a month, commencing with October of his second year at the Naval Academy.

PAY AND ALLOWANCES

The pay of a Midshipman is $111.15 a month ($1,333.80 a year), commencing at the date of his admission. The purpose of this pay is to cover expenses associated with training at the Naval Academy, including the following items:

a. Prescribed uniforms and required clothing
b. Textbooks and equipment
c. Sundries (for cleanliness, health, and relaxation)
d. Services (laundry, tailor, cobbler, and barber)
e. Moderate allowance for extracurricular activities (to broaden professional background and competence)
f. Leave money (provided a sufficient balance is maintained in the midshipman's pay account)
g. Moderate allowance to maintain outfit
h. Funds to purchase necessary uniforms and equipment for graduation outfit so that the graduate will be in all respects ready to assume duties as a commissioned officer

In addition, a ration allowance at the rate of $1.35 per day provides board.

Midshipmen are expected to live frugally and within the limits of their pay. Maintenance allowances are designed to meet normal demands. Through wise use of pay, it is possible to have funds available to meet expenses during annual leave periods.

Medical, dental, and hospital services are furnished without cost to all midshipmen as they are to other personnel of the Navy on active duty.

How To Become a Midshipman at the Naval Academy

Each candidate for admission to the Naval Academy must:

1. Meet general eligibility requirements
2. Obtain a nomination
3. Qualify scholastically (academically)
4. Qualify physically

General Eligibility Requirements

Citizenship

All candidates for admission to the U.S. Naval Academy must be male citizens of the United States, except as provided by law for limited numbers of citizens of other American Republics, and the Philippine Republic. An alien can be admitted as a midshipman only by an act of Congress.

Age

Age limits are established by law. Candidates must be between 17 and 22 years of age. To be eligible for admission, a candidate must have reached his 17th birthday but not have passed his 22d birthday on or before 1 July of the year in which admission is desired.

Character

Candidates must be of good moral character. This prerequisite is usually passed upon by the member of Congress making the nomination. The Secretary of the Navy may, however, decline to accept the nomination of any candidate in the event conclusive evidence of unsuitable character is submitted. For other sources of appointments, investigation of character qualifications rests jointly with those authorized by law to sponsor such nominations and the Navy Department.

Marital Status

No person who is married, or who has been married, is eligible for admission to the Naval Academy, regardless of his other qualifications. Midshipmen may not marry, and any midshipman found to be or have been married will be discharged.

OBTAINING A NOMINATION

There are several ways of obtaining a nomination for admission to the Naval Academy. The variety of types of nominations is intended to make it possible for young men from all over the United States to

compete for appointments as midshipmen. In the following paragraphs, prospective candidates can learn what appointments they may be eligible for, and how to apply for a nomination for each. In some cases, candidates will find that they are eligible for more than one type of nomination. In such cases it will usually be to their advantage to apply for more than one nomination.

Candidacy must be established in time to participate in the March administration of College Entrance Examination Board Tests. The Naval Academy will also consider for academic qualification results obtained on the immediately preceding December or January tests of the College Board. Early application and participation in the entrance tests is encouraged. Only the Chief of Naval Personnel may issue authority to take the necessary College Board tests as a formally designated candidate for appointment to the Naval Academy.

Presidential Appointments

Presidential appointments are available to sons of officers and enlisted personnel of the regular Army, Navy, Marine Corps, Air Force, and Coast Guard. To make application for appointment from this source, the candidate or his parent should address a letter to the Chief of Naval Personnel, Navy Department, Washington, D.C., 20370, clearly indicating the service connection of the parent and giving the son's full name and date of birth. The letter of application should also designate the year in which admission to the Naval Academy is desired. Letters of application should be forwarded any time after July 1 of the year preceding that in which admission is desired, but not later than February 1 of the admission year.

From this source 75 candidates may be appointed annually. In the event of vacancies in the annual quotas of appointments authorized from the Navy and Marine Corps and the Naval and Marine Corps Reserves, qualified Presidential nominees in excess of the normal Presidential quota may be admitted to fill such vacancies.

Congressional Appointments

The Vice President of the United States, each U.S. Senator, each Representative in Congress, and the Resident Commissioner of Puerto Rico may have five appointees at the Naval Academy at any one time. The Vice President makes his nominations from the United States at large. The U.S. Senators must make their nominations from residents of their respective States, and the Members of the House of Representatives must make their nominations from residents of the Congressional districts which they represent.

Members of Congress are authorized to nominate a maximum of six candidates for each vacancy. The Candidates so nominated are usually designated as the principal and the first, second, third, fourth, and fifth

alternates. Members of Congress may designate their nominees as competitive alternates and leave to the Academic Board at the Naval Academy the designation of the principal and the order of the alternates on the basis of merit.

Application for nomination should be made directly to the Vice President, Senator or Representative. It is in order for a candidate to include in his letter of application for a nomination such items as favorable endorsements by school officials and others. Application should be made at least a full year in advance of the year in which the candidate hopes to enter as a midshipman, because some Congressmen require candidates to compete for nominations by taking a special examination. Such examinations are usually held in July or November. They are not to be confused with, or considered a substitute for, the College Entrance Examination Board tests required by the Naval Academy.

Appointments From the Regular Navy or Regular Marine Corps

Enlisted men on active duty in the regular Navy or Marine Corps are eligible for 85 appointments annually. Enlisted men desiring to become career commissioned officers should apply to their commanding officers for permission to take a preliminary screening examination which will be given throughout the Naval Establishment early in July of the calendar year preceding that in which admission to the Naval Academy is sought. Those who successfully pass the initial screening measures will be assigned to the preparatory school which the Navy maintains to aid enlisted candidates in their preparations for the formal entrance tests and for the Naval Academy program. The entrance tests consist of the College Entrance Examination Board Scholastic Aptitude Test and achievement tests in English and mathematics. The competitive rating of the successful candidates will be determined by the Naval Academy Academic Board and will be based upon a "whole man" evaluation, including test scores, school records, extracurricular activities, both athletic and nonathletic, and upon the assembled evidences of motivation and good character. Qualified candidates in excess of this quota may be appointed to fill vacancies in the quotas of the President and the Naval and Marine Corps Reserves.

Appointments From the Naval Reserve or Marine Corps Reserve

Enlisted men of the Naval and Marine Corps Reserves, whether on active or inactive duty, are eligible for 85 appointments annually. Applicants must have had at least 1 year in the Reserve by July 1 of the year of admission to the Naval Academy. They must have attended a minimum of 26 drills between July 1 and March 15 preceding admission. Active service may be accepted in lieu of drills, 1 full day of active service being the equivalent of one drill.

Those who are successful in obtaining authority to compete for appointment from this source will be authorized to appear for the formal entrance tests, which consist of the College Entrance Examination Board Scholastic Aptitude test and the achievement tests in mathematics and English. The competitive rating of the successful candidates will be determined by the Naval Academy Academic Board and will be based upon a "whole man" evaluation, including test scores, school records, extra-curricular activities, both athletic and non-athletic, and upon the assembled evidences of motivation and good character. Qualified candidates in excess of this quota may be appointed to fill vacancies in the quotas of the President and of the Regular Navy and Marine Corps.

Naval and Marine Corps reservists who are on regular (not training) active duty at the time of formal nomination for appointment may also apply for assignment to the preparatory school which the Navy maintains to aid enlisted candidates in their preparations for the entrance tests, and for the Naval Academy program.

Appointments From Honor Military and Naval Schools

An honor graduate or a prospective honor graduate of a designated honor military or naval school should apply to the principal of his school for nomination as a candidate for admission to the Naval Academy. Each designated honor military or naval school may nominate 3 honor graduates or prospective honor graduates each year to compete among themselves for 10 vacancies for midshipmen. The details of submitting nominations are handled by the school concerned and the Chief of Naval Personnel, Navy Department, Washington, D.C., 20370.

Appointment From NROTC Units

Only contract students in the Naval Reserve Officers Training Corps units at various colleges and universities are eligible to apply for appointments from this source. Contract students should apply to the Professor of Naval Science at the college or university, who will in turn forward his recommendations to the president of the college. Not more than 3 candidates may be nominated each year by each of the educational institutions in which an NROTC unit is in operation to compete among themselves for 10 vacancies to the Naval Academy.

Other Sources of Appointments

Those applying for nominations under the laws providing for the sons of deceased veterans and the sons of holders of the Medal of Honor should write to the Chief of Naval Personnel, Navy Department, Washington, D.C., 20370. Such applicants should give the full name, rank or rating, and organization of the deceased veteran or the holder of

the Medal of Honor, the full name of the candidate for appointment as midshipman, his date of birth, and such other pertinent information as will assist in the positive identification of both the parent and the candidate. Residents of the District of Columbia should apply directly to the Commissioners of the District of Columbia for full details at least 1 year in advance of the year in which the candidate hopes to enter as a midshipman.

Application for appointment from the Canal Zone, Virgin Islands, Guam, or American Samoa must be addressed to the respective Governor, and application for the appointment of a native of Puerto Rico must be addressed to the Governor of Puerto Rico.

Additional Appointments From Among Qualified Alternate Nominees and Competitive Candidates

The Secretary of the Navy is authorized to appoint additional midshipmen from qualified alternates and qualified competitive quota candidates in order to bring the Brigade of Midshipmen to authorized strength. When the number of additional admissions is determined, the Academic Board will review the records of all scholastically qualified candidates within each nomination source. Application by the individual is not necessary or desired since all qualified candidates are considered by the Academic Board. Selections will be made from those whose records are outstanding in scholarship, whose character and personality are established as decidedly superior in statements of recommendations from school and other officials, and in whose cases there is marked evidence of leadership potential as indicated by class offices held, participation in extracurricular and community activities, and other achievements of note. The first one hundred and fifty of those so appointed must be qualified congressional alternates. At least three-fourths of the remaining qualified alternates receiving appointments must also have been nominated from congressional sources.

ACADEMIC QUALIFICATIONS

Scholastic Preparation

The scholastic requirements for admission to the Naval Academy and the arrangement of the first-year course of instruction anticipate a 4-year high school course as the minimum of preparation. The ideal arrangement of preparatory studies is one which includes 4 years of English; at least 3 years but preferably 4 years of mathematics, including algebra, geometry, and trigonometry; chemistry; physics; U.S. history; at least 2 years of a foreign language; and mechanical drawing. The remaining courses necessary to round out the full high school schedule should be chosen from subjects such as biology, the foreign languages, philosophy, astronomy, economics, government,

physical geography, or from other subjects in the social or physical sciences. At least 15 units of credit should be presented. Graduation from an accredited 4-year high or preparatory school (or its equivalent) is mandatory, and the record of work done must be acceptable to the Naval Academy Academic Board in terms of subject matter and level of achievement. Preparation should be thorough, because at the Naval Academy the pace is rapid and midshipmen are required to participate in other than academic areas of instruction looking toward the development of suitable military character.

The courses in the desirable subjects that are offered in the high and preparatory schools throughout the country that are accredited by the recognized accrediting agencies are adequate in content and scope to fulfill Naval Academy requirements and to prepare for the essential College Entrance Examination Board tests.

Method of Qualifying

There are two methods by which a candidate may qualify academically for admission to the Naval Academy:

1. College Board tests and secondary school record
2. Secondary school and college certificates

Candidates holding noncompetitive congressional nominations and the sons of holders of the Medal of Honor are permitted to use either of the two methods, and in these instances it is the candidate's responsibility to determine which method offers him the greater possibility of success. All other candidates must take the necessary College Entrance Examination Board tests in December, January, or March of the school year preceding admission.

In the following brief description of the two methods, only the essential features are covered. Candidates, prospective candidates, and school officials are invited to correspond with the Dean of Admissions, U.S. Naval Academy, Annapolis, Md., regarding any point in the admission requirements on which further information is desired.

All candidates for admission must have an accredited high school certificate. It is important that each candidate insure that his complete high school record and the record of any college work which he may have completed be furnished the Naval Academy.

College Board Tests and Secondary School Record Method

The basic method of qualifying is by presenting an acceptable secondary school record and taking the College Entrance Examination Board tests, as follows: The Scholastic Aptitude Test (verbal and mathematics sections), the English Achievement Test, and either Level I (Standard) or Level II (Intensive) Mathematics Achievement Test.

All candidates for appointment from the various competitive sources and all other candidates not qualifying by the College Certificate Method must take this series of tests.

Each duly nominated candidate must register with the College Entrance Examination Board for the December, January, or March series of tests as promptly as possible after receiving the necessary instructions from the Bureau of Naval Personnel, Navy Department, Washington, D.C., 20370. These instructions will provide for payment by the Navy of fees for tests. Although the Navy Department will pay for only one administration of the tests, the Naval Academy will accept scores from the other administrations specified above and will credit the candidate with the highest scores achieved.

Information on the tests, including dates of administration, location of testing centers, dates by which candidates must register, method of application, etc., is published in a booklet entitled *Bulletin of Information.* A copy may be obtained without charge by writing to the College Entrance Examination Board, Post Office Box 592, Princeton, N.J., 08540 or Post Office Box 1025 Berkeley, Calif. 94701.

Satisfactory scores on the College Entrance Examination Board Tests will be determined by the Academic Board of the Naval Academy. No candidate will be admitted to the Naval Academy unless in the opinion of the Academic Board he shows the requisite mental qualifications.

A high school certificate is required for eligibility and school records will be a consideration in determining whether or not a candidate is to be accepted. A good secondary school record is one which reports grades of good quality for a desirable arrangement of preparatory courses chosen from those listed above under the heading "Scholastic Preparation" and a breadth of school interests and extracurricular activities indicative of a well-rounded student. For other than exceptional cases, no credit will be allowed in a certificate, or as evidence of required review, for work done under a tutor, in correspondence courses, or in nonaccredited schools.

College Certificate

The college certificate method of fulfilling the educational requirements for admission is available only to candidates holding noncompetitive congressional nomination and to sons of holders of the Medal of Honor.

To qualify by the college certificate method, a candidate must, in addition to satisfying the requirements in a secondary school certificate, present a certificate from an accredited junior college, technological school of college grade, college, or university, attesting the completion of 1 year of college work with grades acceptable to the Naval Academy. The college certificate must include at least 6 semesters hour of mathe-

matics selected from college algebra, trigonometry, calculus, etc., 6 of college English and/or history, and sufficient other subjects acceptable to the Naval Academy to establish a total of at least 24 semester hours of credit for the year's work. College credits which have been used to offset deficiencies in a high school certificate will not be counted toward meeting the requirements for an acceptable college certificate.

Any candidate who is at all uncertain as to his ability to qualify by the college certificate method is strongly advised to take the College Entrance Examination Board Tests. However, failure to score acceptably on the entrance examination will disqualify the candidate for entry in that year.

PHYSICAL QUALIFICATION

The Chief of Naval Personnel, Navy Department, Washington, D.C., 20370, will send to each duly nominated candidate an authorization designating time and place of physical examination. Physical examinations are conducted at specified naval hospitals, and other specified naval activities in various parts of the United States during the months of November through March. Candidates are required to be physically fit, well-formed, and of sound constitution. The physical requirements are exacting. The best interests of the Government, the Navy, and the individual demand that they be so.

Detailed information concerning the physical requirements and the list of places at which examinations are given is contained in the pamphlet "Regulations Governing the Admission of Candidates into the United States Naval Academy as Midshipmen," which may be obtained from the Chief of Naval Personnel or from the Naval Academy.

U.S.S. *Long Beach*—Nuclear-Powered Missile Cruiser

The Naval Officer's Career

A WAY OF LIFE

Inscribed in Latin above the bronze doors of the Naval Academy Chapel is the motto, "Not Self, But Country"—a motto which the young candidate embraces the moment he takes the oath as a midshipman and which will be a part of his being for the rest of his life. His education at the Academy has been designed for one purpose only: to prepare him for a lifetime career as a dedicated professional in the naval service. After 4 years of intensive study at Annapolis, he is ready to assume his responsibilities as an officer in the greatest Navy in the world.

This is a complex Navy—one whose ships range every ocean, whose officers and men not only sail the seas but who are engaged in construction and research from the tropics to the poles, whose supersonic planes have provided the training ground for America's first astronauts, whose nuclear submarines are a testimony to America's engineering genius, whose leaders advise in the highest councils of government, whose Marines stand second to none where tales of valor are told. This is a vastly complicated and technological Navy, yet one in which the human being is, in the end, all important. It is an organization which puts a high premium on leaders with vision, dedication, and ability. It is a Navy with a proud past and a promising future, broad enough to provide a stimulating challenge in a wide spectrum of interesting fields.

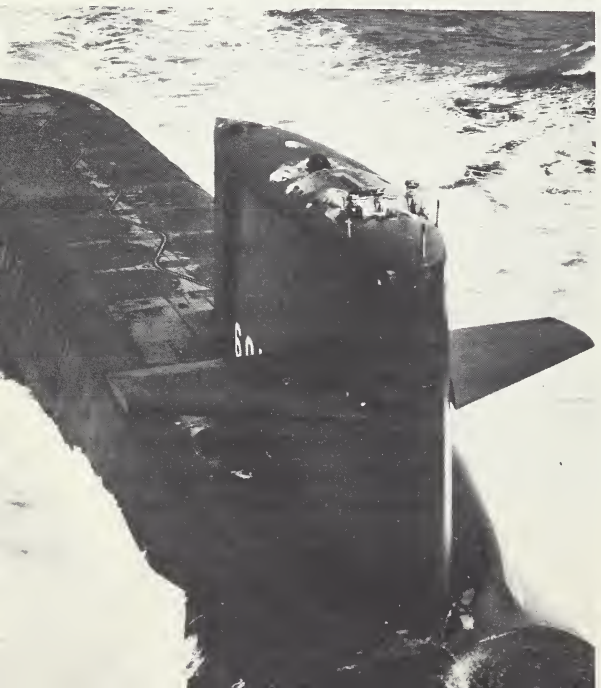
A4 Skyhawks in Formation

Navy Astronaut in Space Capsule

FIRST DUTY

A graduate's first career opportunity comes in his choice of branch of the Service. The priority assigned his individual preference is dependent upon a number of factors, including his standing in class, the needs of the Service, and his personal qualifications; but every attempt is made to assign him to the duty and locality of his first choice.

Whatever his initial operational duty, he will usually find that his responsibilities are larger than those of his contemporaries in civilian life. Most Naval Academy graduates are commissioned as



U.S.S. *Robert E. Lee*— Nuclear-Powered Ballistic Missile Submarine

ensigns in the line and are, thus, ultimately headed for command at sea. The majority go to sea initially in a combatant-type ship—i.e., aircraft carrier, cruiser, destroyer, or amphibious craft—but some are kept ashore to attend specialized schools before joining the fleet. Included in this group are those graduates entering the nuclear submarine field and those headed for flight training and a career in naval aviation.

A small number are commissioned on graduation in the Civil Engineer Corps, in the Supply Corps, or as Engineering Duty officers. The civil engineer designees, after a short tour in a Public Works or Seabee outfit, proceed to a civilian university to pursue a post-graduate course. Supply Corps officers attend a special Navy school of several months' duration prior to their first operating assignment. The Engineering Duty officers (specialists in ship design, construction, and repair) will normally spend several months aboard ship before returning to postgraduate work. Those commissioned as Second Lieutenants in the Marine Corps are ordered to a course in basic training before joining regular Marine units.

OFFICER EDUCATION AND TRAINING

Upon graduation and commissioning, the new officer may lay his books aside momentarily, but his theoretical and practical education will continue as long as he is in the Service. From graduation day forward, he will continue to prepare himself for assignments of greater responsibility and professional attainment by acquiring practical experience ashore and afloat and through advanced academic work. The extent of his attainment is limited only by his own ability, initiative

SeaBees at work in Antarctica

energy, and resourcefulness, commensurate with logical career planning.

The Naval Academy is considered but the first step in the educational ladder for the typical officer, and so the Navy sponsors a wide variety of programs, at both naval and civilian institutions, designed to prepare the officer for higher responsibility in the service of the United States. This move toward postgraduate education is begun in some cases before graduation, when a few midshipmen are selected to compete for scholarships in civilian universities. Most notable in this area, and the one in which Academy graduates have been most successful to date, has been the Rhodes Scholarship, tenable at Oxford University.

As noted above, a small number of officers who have been selected for a specialty career in engineering will normally proceed to postgraduate work for the master's degree shortly after graduation. For the majority, however, Navy functional and basic technical courses provide their first post-commissioning training. Mostly of short duration, they are in such fields as communications, gunnery, antisubmarine warfare, damage control, electronics, and amphibious warfare.

After his first tour (3 to 6 years) of operational duty with the Fleet, the qualified Naval Academy graduate may expect orders to a postgraduate school for one or more years. Many fields of study are open to him, including, but not necessarily restricted to, those of mathematics, physics, general science, various types of engineering (nuclear and aeronautical, for example), management, international relations, and naval intelligence. For the best qualified, the way is open to a doctorate. Courses are conducted at the U.S. Naval Postgraduate School, Monterey, Calif., the Naval Intelligence School, Washington, D.C., Test Pilot School, Patuxent River, Md., and various civilian institutions such as Carnegie Institute of Technology, Harvard, MIT, Princeton, Rensselaer, Stanford, and Tulane.

It should be noted not only that opportunities for postgraduate work are afforded in the early years of commissioned service, but that they continue throughout an officer's career. Senior war colleges, in particular, are noted for bringing officers up to date on problems of international import and their effect on our global strategy. The officer who aspires to positions of high responsibility will, of necessity, have to continue to grow intellectually and thus to be part-student all of his professional life.

OFFICER CAREER PATTERNS

Within the framework of the needs of the Service an officer determines his own career pattern to a significant degree through his requests for assignments afloat and ashore, his advanced studies, and, of course, by his performance. Most graduates, after their first tour at sea, elect to continue as line officers, many of them requesting assignment at this time to flight or submarine training. A small

number may apply to serve in more specialized fields, and are designated, as were some of their classmates at graduation, as Civil Engineer Corps, Supply Corps, or Engineering Duty officers. The careers of many of these specialists tend to concentrate in the industrial management field and, to some extent, in research and development, and much of their work is with the civilian world.

A line officer finds that tours of operational duty with Fleet components are alternated with assignments to bureaus, offices, and activities in the Navy's vast shore establishment. Experience at sea is of prime importance to this officer, for it is at sea that he increases his competence as a mariner and as a leader. The early years of experience at sea form a basis for his career which will include bringing his sea-going experience to the management of certain supporting shore facilities. Assignments are varied and interesting, and include not only military command but the opportunity to work with the civilian employees of the Armed Forces as well as with members of other Services. In all assignments, individual preference is given careful consideration.

Officer careers continue along many paths, depending upon individual experience and background. After his postgraduate tour, a line officer may return to sea as a head of department in a destroyer or commanding officer of a smaller combatant vessel. Line officers who are aviators may expect to resume duty in an aircraft squadron based in a carrier or ashore. Others who are qualified in submarines will continue in duties preparing them for submarine command, which comes after about 12 years of commissioned service.

Every officer may expect to serve in billets in which his naval education will be most valuable. Many line officers qualify for a subspecialty which they exercise during periods of shore duty. These specialties include such varied fields as naval intelligence, oceanography, communications, meteorology, nuclear engineering, and aeronautical engineering. In addition, officers aspiring to command at sea will serve in a variety of ships or aircraft in different capacities, as well as in staff and planning billets afloat and ashore, in the United States and overseas, to prepare them further for command.

It is a satisfying, but demanding, life. The naval officer presents many faces to the world: Fleet Commander, engineer, scientist, diplomat, educator. His is not just a job, but a way of life—a career dedicated to the service of the United States carrying with it high professional prestige and opportunities for broad experience—a career which rewards the industrious, the sincere, the adventurous, and the imaginative. The Navy is not a career field for those who prefer a soft life to shy away from challenges. It is, rather, one for those to whom the homely virtues of the strenuous life, patriotism, and dedication to an ideal have a real meaning which can be translated into a lifetime of service in the Navy of the United States.

Description of Courses

In the following description, courses are grouped by departments. Basic curriculum courses are described first, followed by elective courses.

COMMAND DEPARTMENT

The objective of the Command Department is to teach the midshipmen the fundamentals of naval leadership, military law, navigation, meteorology, oceanography, methods of operations analysis, and naval operations in the air, on the surface, and under the seas. Elective courses in Military Psychology, Advanced Navigation, Astronomy, Oceanography, Applied Oceanography, and Naval Strategy and Military Planning, and Introduction to Decision Theory are offered.

The department provides academic studies during the last 2 years in navigation, current and advanced concepts of naval operations, and the techniques of naval leadership, including psychology, management, and military law. Practical application of all aspects of shipboard operations, including leadership as well as seamanship, rules of the road, shiphandling, communications, and shipboard organization are presented throughout the entire 4 years, culminating each spring in multiclass exercises in naval tactics aboard patrol craft. Aviation experience is provided during Second Class summer. First Classmen participate as junior officers in summer cruises aboard fleet ships operating around the world. The midshipman is thus developed through study, classroom instruction, and practical application for service as a career Naval Officer.

Marlinspike Seamanship

Instruction Aboard Yard Patrol Craft (YP's)

FOURTH CLASS YEAR

Summer

C100 *Basic Seamanship and Navigation.* Practical instruction in elementary seamanship, including marlinspike and deck seamanship, powerboat handling, sailing, rules of the road, elements of navigation, lookout and telephone talker procedures, signaling (flashing light and signal flags), elementary piloting and ship handling, and naval orientation.

Frogman Training

Vertical Envelopment for Amphibious Operations

Second Semester

C104 *Shipboard Organization and Fleet Operations.* Practical instruction in Combat Information Center procedures, shipboard communications, deck seamanship, elementary tactics and seamanship in YP craft and summer cruise orientation and indoctrination presentations. *Three-quarters semester hour.*

THIRD CLASS YEAR

Summer Cruise

The third classman is introduced to life aboard ships of the U.S. Fleet at sea by serving in specific billets and actively participating in a wide range of shipboard evolutions. He lives as an enlisted man performing routine ships work, standing deck, Combat Information Center and engineering watches, operating ship's boats, and exercising

Flight Instruction

Celestial Navigation Instruction

at general shipboard drills. He completes the required practical factors for seaman and fireman. He receives, in a separate phase, a concentrated indoctrination in amphibious operations and participates in an actual amphibious landing exercise.

Second Semester

C204 *Seapower.* Presentations by special teams from the various Type Commands of the U.S. Atlantic Fleet, portraying the dynamic applications of seapower in an age of rapid technological progress, and describing the major facets of the role played by the fleet from the point of view of the future destroyerman, submariner, aviator, and marine officer. *One-quarter semester hour.*

SECOND CLASS YEAR

Summer

Summer Cruise. Broadens professional training by providing indoctrination in naval aviation. Each midshipman is given actual flight

instruction in control of naval training aircraft and visits fleet aviation squadrons for operational familiarization at naval air stations.

C300 *Air-Ocean Environment.* An introductory course designed to acquaint the student with the air-ocean environment. Includes the study of the structure of the atmosphere, oceans, and ocean basins. A description of the physical parameters and elements of the two media; their measurements, distribution, and interactions in space and time; energy sources; the causes and effects of atmospheric and oceanic circulations. Includes the study of fronts, storms, sea waves, nearshore circulations, and climatology.

First Semester

C301 *Piloting and Navigation.* Instruction in visual and radar piloting, including aids to navigation, navigation instruments, tides and current, charts and publications, and low-visibility piloting. Supported by afloat piloting and anchoring practical instructions. Solutions of elementary relative movement problems using the maneuvering board. The fundamentals of navigational astronomy, time, and an introduction to celestial navigation.

Second Semester

C306 *Introduction to Military Psychology and Management.* Introduction to the study of psychology, including maturation, motivation, emotions, learning, perception, psychological measurement, personality and social influences on behavior. Introduction to the study of management with emphasis on the principles and functions of management, with discussion of the procedures and techniques in applying human relations to naval management. *Two and one-half semester hours.*

C308 *Navigation.* Celestial and electronic navigation. Principles of Maritime Law. Practical instruction in Combat Information Center, and fleet operations practical instructions aboard YP craft. Practical indoctrination in the use of the sextant, piloting by radar, loran, and visual means, and participating, under the supervision of first classmen, in tactical operations employing current fleet anti-submarine concepts.

FIRST CLASS YEAR

Summer Cruise

During his second afloat cruise the midshipmen stands the watches and performs the duties of a junior officer. He is exposed to the social courtesies, amenities, and customs of wardroom life aboard ship by subsisting in the wardroom mess. Training programs are employed consisting of day's work in navigation, watchkeeping on the bridge and in the Combat Information Center, lectures, and studies required in the completion of his *cruise journal.*

First Semester

C407 *Case Studies in Leadership and Military Law.* Group discussion and case study methods are used to analyze current, typical junior officer leadership and management situations, with emphasis on self-development and individual responsibility. The objective of the course in Military Law is to give the midshipmen an understanding of those aspects of Military Justice and International Law which are of most use to a junior officer. *Two and one-half semester hours.*

C411 *Naval Operations I* (3¾ semester hours) and (SECOND TERM)

C414 *Naval Operations II* (4½ semester hours)

Naval Operations I and II provide general instruction in naval operations. The second semester is a logical continuation of the first. The subject is approached from two widely separated viewpoints. In one phase (approximately 30 percent of the course) the mission and capabilities of the U.S. Navy are critically examined, both as they represent implementation of national and military strategy and as they are affected by political, economic, and technological influences. Cognizance is taken of the present and projected state of international affairs as a basis for indicating the types of war which the Navy must be prepared to fight. Also included in this portion of the course is a functional description of the Department of Defense.

The remaining and major portion of the course is devoted to an analysis of naval tactics and their relation to the broad concept of naval operations. Operations analysis techniques, which are well within the mathematical capability of first class midshipmen, are used to develop understanding of several basic aspects of naval warfare (e.g., search, detection, kill). This knowledge is then applied to an analysis of air warfare, antiair warfare, and antisubmarine warfare with a view to optimizing tactics and procedures and determining force requirements and the comparative effectiveness of equipments in operational situations. The ultimate intent of this portion of the course is to provide an understanding of the theories which have been used in the development of basic naval tactics. This objective is complemented by that of the associated drill program which emphasizes the practical aspects of using standard naval tactics.

ELECTIVE COURSES

C602 *Astronomy.* An introductory course designed to give an appreciation of the universe and to develop interest in interplanetary navigation and space travel. Two aspects of modern astronomy receive particular emphasis: first, the tools and methods employed in the collection of astronomical data and the reduction of observations to sound conclusions; and second, those elements of astronomy which relate to modern experiments in space and astronautics.

C603 *Oceanography.* An introduction to the basic characteristics, processes, and associated principles involved in the study of the sea, including the examination of the scientific and mathematical disciplines relating to the ocean environment. The physical and chemical properties of sea water, the size and composition of the ocean floor, the characteristics of plant and animal communities are covered. Heat and energy considerations in the ocean, specific ocean areas and basins, the origin and movement of water masses, and the dynamics of ocean currents, waves, and tides are studied.

C606 *Applied Oceanography.* The course provides knowledge and techniques for examining the practical aspects of oceanography. Includes the statistical approach to the study of ocean waves, with application to forecasting techniques, ship routing, and amphibious operations; heat exchange processes in relation to the formation, decay, and prediction of sea ice; environmental characteristics as they affect underwater sound propagation and sonar systems. Environmental prediction systems as they relate to the ASW problem are emphasized.

C805 *Military Psychology.* A study of those aspects of social psychology applicable to the military situation, including basic psychological factors, social attitudes, the social and cultural habitat, military organizations as social systems, leadership groups, and individual role behavior and personality in military groups. *Two semester hours.*

C806 *Advanced Navigation/Astronautics.* A continuation of Basic Navigation using more specialized navigation theories and techniques. Specialized chart usage, magnetic compass adjustment, gyros, lifeboat and solar navigation. Celestial concepts and theories emphasizing their practical application to navigation. Basic astronautics: inertial and space navigation, satellites, space flight, and the solar system.

C808 *Naval Strategy and Military Planning (Seminar).* The fundamental factors involved in the formulation of a national strategy; relationship between national policy and naval strategy; classic and current strategic concepts and their application in international situations. A detailed study of the naval planning process and demonstrative planning problems. *Three semester hours.*

C810 *Introduction to Decision Theory.* Uncertainty and randomness and their effects on decisionmaking; utility and descriptive statistics; utility and fair bets in the St. Petersburg Paradox; uncertainty due to ignorance of the state of nature; formulation and computation of Bayes strategies; minimax strategies and regret; probability and utility models. Applications in the areas of naval operational testing and decisionmaking. *Two semester hours.*

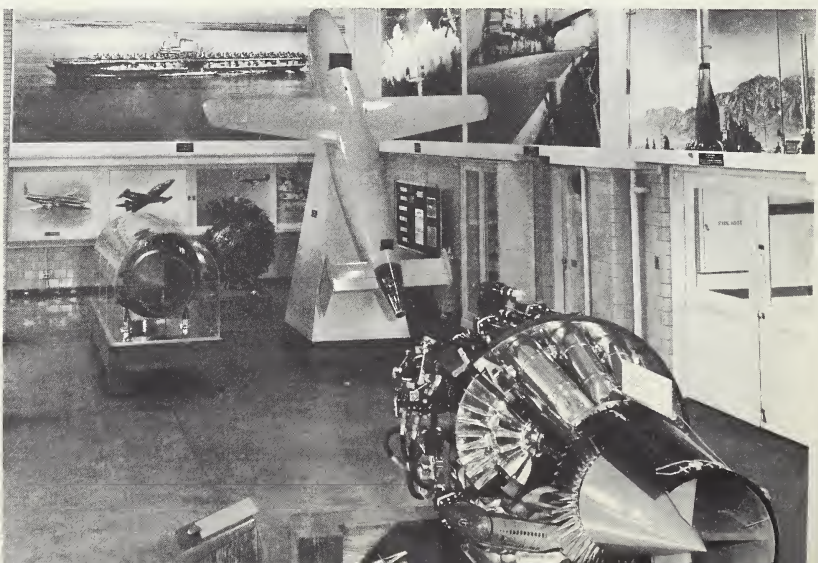
Nuclear Reactor

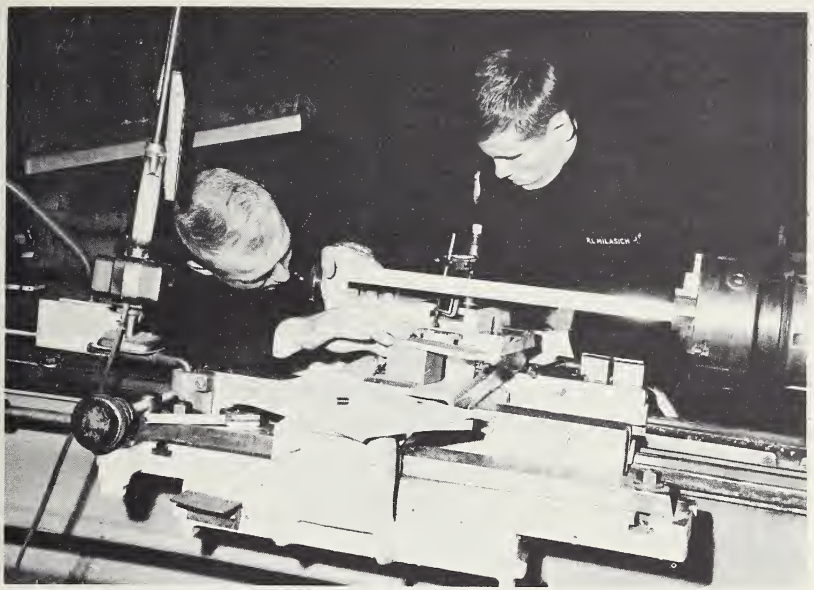
ENGINEERING DEPARTMENT

The objective of the Engineering Department is to give midshipmen an understanding of basic engineering concepts and to teach them to practice an orderly analytical approach to engineering problems.

The basic curriculum program is strongly supported by materials testing, thermodynamics and fluid mechanics laboratories, including wind tunnel and towing tank. It is further enhanced and developed by a carefully designed departmental electives program which includes exercises in the nuclear facility laboratory.

Machinery Models





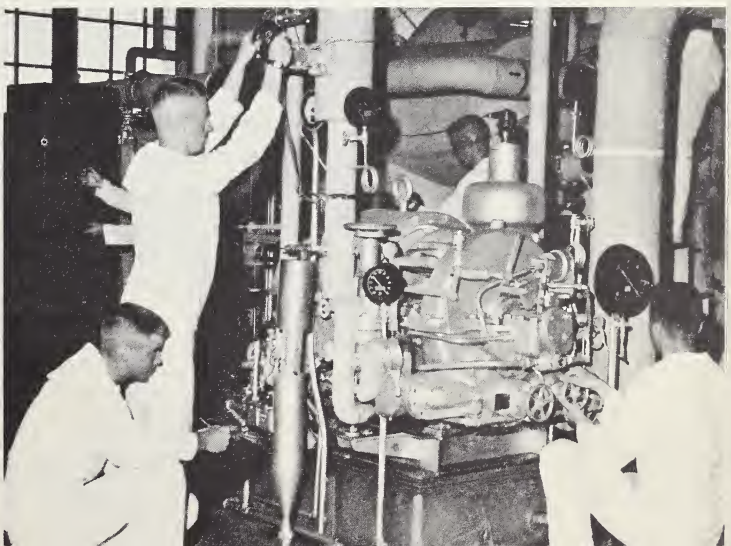
Machine Shop

FOURTH YEAR CLASS

Summer

E100 *Introduction to Engineering Practice and Applications.* An introduction to the study of marine and mechanical engineering, through lectures, demonstrations, and examinations of sectioned machinery and models. Demonstrations in basic shop practices are conducted, familiarizing students with fabrication process from pattern shop through foundry to machine shops. Students are introduced to engineering laboratories and laboratory functions in relation to their 4-year engineering curriculum and to the needs and requirements in engineering drawing and its techniques and basic principles.

Practical Thermodynamics



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First Semester

E105 *Engineering Drawing and Descriptive Geometry.* An introduction to the science of graphical communication, stressing engineering graphical methods and disciplines with special emphasis on spatial analysis and visualization. The course is conducted so as to develop the student's ingenuity and potential in problem solving, creative thought, freehand sketching, and analysis of three-dimensional space problems. Topical coverage includes points, lines, planes, and solids in space with analysis by orthographic, axonometric, and oblique projections. Descriptive geometry covers solution of space problems involving points, lines and planes as well as parallelism, perpendicularity, and angularity of lines and planes and relationships of these to curved surfaces. *Three semester hours.*

Second Semester

E106 *Statics.* Statics is that part of the physical science known as mechanics which deals with the state of rest of bodies under the action of forces. The course emphasizes analytical problem solution and deductive reasoning to develop a logical and orderly process of thinking. Areas covered are the definition of vectors and force systems; the parallelogram law, triangle law, and the vector polygon; treatment of coplanar force systems, moments, couples, equilibrium, free-body diagrams, structures, trusses, frames and machines, centroids of areas and distributed loads on beams. *Two semester hours.*

E107 *Statics* (*Advanced Course*). (May be taken in lieu of but not in addition to E106.) This course is designed for validating midshipmen having the necessary proficiency in mathematics. In addition to the topical coverage of E106, the following areas are included: center of gravity, centroids of lines, areas and volumes, beams with distributed loads, dry friction, disc and pivot friction. *Three semester hours.*

E109 *Descriptive Geometry.* (An advanced course taken in lieu of E105 by students who have had sufficient drawing training before entering the Naval Academy.) Descriptive geometry, the science of graphic representation and solution of space problems, is based on the principles of orthographic projection. It uses these principles in the representation and solution of engineering problems more advanced than those usually encountered in an elementary course in engineering or technical drawing. Topical coverage includes space analysis, intersection of planes with solids, topography, representation of fair surfaces and delineation of ships' lines, intersection of surfaces, development of surfaces, and vector geometry.

THIRD CLASS YEAR

Summer Cruise

During his first cruise, the Third Classman is introduced to the organization of a combatant vessel's Engineering Department and is informed of the kind, purpose, and function of naval main propulsion and auxiliary units.

First Semester

E203. *Strength of Materials.* An introduction to the mechanics of engineering materials with primary emphasis on their elastic behavior. Classroom work is concerned with axial stress and strains, torsion, combined stresses, Mohr's circle, thermal stresses, shear and bending-moment diagrams, the flexure formula, the equation of the elastic curve, and beam deflections. *Three semester hours.*

Second Semester

E204 *Engineering Materials.* A general study of engineering materials—ferrous and nonferrous metals, high-grade ceramics and cermets, and the high polymers. The scope of the course includes the fundamentals of material structure, the theory of testing and failure of metals, material behavior under dynamic loading, short- and long-time high temperature failures, theory of alloying, combined effects of heat treatment, nonferrous metals, powder metallurgy, plastics, and radiation effects on engineering materials. The course work includes demonstrations of heat treatment phenomena, metallographic analysis, microscopy, and fundamental testing techniques. *Three semester hours.*

SECOND CLASS YEAR

Summer

E300 *Ship Hydrostatics* (*Buoyancy and Stability*). A comprehensive laboratory study of the static forces acting on the ship afloat, both in the normal upright condition and in inclined situations, including the effects of weight additions and removals, weight shifts, and loose liquids. Stability of the ship is investigated through the use of laboratory models both in the initial condition and throughout the range of stability. The nature, importance, and limitations of the metacenter, ship's hull form, and loading are emphasized. Damaged stability, including free communication, is analyzed with support of large compartmented floodable models and inclining apparatus. *One-half semester hour.*

First Semester

E305 *Thermodynamics I.* A first course in thermodynamics emphasizing the classical approaches to and developments from the First and

Second Laws including Clausius' inequality. The course includes consequences of the First and Second Law, properties of gases, vapors, and mixtures; analysis of processes and cycles involving gases and vapors; and an introduction to the study of psychrometrics. *Four semester hours.*

Second Semester

E306 *Fluid Mechanics I.* The course covers fluid properties; fluid statics; basic flow concepts; basic equations, including conservation of mass, momentum, and energy and the equation of state; dynamic similitude, including Reynolds, Mach, and Froude's numbers; viscous effects, including the boundary layer, turbulent flow, head loss, drag; frictionless compressible flow; two dimensional ideal fluid flow. *Four semester hours.*

FIRST CLASS YEAR

Summer Cruise

During his second cruise, the First Class midshipman becomes familiar with the organization, facilities, and functions of the Engineering Department of a typical combatant vessel. He learns the duties of a junior officer by standing watches throughout the Engineering Department and by exercising the responsibilities of Engineering Division Officer through the administration and instruction of midshipmen.

First Semester

E405 *Fluid Mechanics II.* Application of the laws of conservation of energy, mass, and momentum to open and closed fluid systems with both compressible and incompressible flow. The student's ability to analyze complex systems in a number of related fields is particularly emphasized. Laboratory work supports and substantiates the classroom analytical work. The course includes compressible gas flow, fluid metering, momentum and energy analysis of turbomachinery, subsonic aerodynamics, and hydromechanics. *Three semester hours.*

Second Semester

E406 *Thermodynamics II.* Application of the laws and principles of thermodynamics to the preliminary design requirements of a propulsion plant for a modern naval vessel. Specifically the course covers choice of cyclic operating conditions and analysis of component parts for such a powerplant. Both cruising and full power requirements of Rankine cycle plants are calculated and compared with other plausible operating cycles and equipment arrangements. *Three semester hours.*

E601 *Kinematics.* A study of displacements, velocities and accelerations of machine elements. Topics include Centros and Kennedy's Theorem; accelerations, Coriolis' Law and Glein's Construction with typical applications such as steering mechanisms, Oldham's Coupling and Hooke's Joint; development of plate and cylindrical cam profiles, follower types and displacements; rolling contact through friction gearing of ellipses and hyperboles; cycloidal and involute gear teeth and modifications; gear trains, rack and pinion, worm and wheel, and special devices such as the differential screw, the swash plate and the Geneva wheel. *Three semester hours.*

E604 *Intermediate Strength of Materials.* Topical coverage includes two-material axially loaded members, welded and riveted joints, shear flow, shear center, unsymmetrical bending, statically indeterminate beams, deflection of beams, column formulae and stress and strain at a point. Topics will be treated from both an elastic and an inelastic viewpoint. *Three semester hours.*

E631 *Introduction to Aerodynamics.* An introductory study of the mechanics and aeronautics of flight. Flight vehicle nomenclature and notation are treated, and the basic laws of fluid mechanics are introduced and applied to the flight vehicle. Specific topics include thrust and power, lift and drag, viscous effects and the boundary layer, and the onset of compressibility. This course is a part of an academic major program in aeronautical engineering which is available to the class of 1966 and subsequent classes. *Three semester hours.*

E701 *Physical Metallurgy.* A study of the principles of physical metallurgy including the analysis of perfect and imperfect crystalline structures, the concept of equilibrium in the solid state, the study of processes in the solid state, the theory of elasticity and plasticity, and the application of these principles to certain important ferrous and nonferrous alloys. Laboratory work includes heat treatment, materials testing, and metallography. *Three semester hours.*

E702 *Systems Engineering.* Relationship between the physical system and the differential equation which expresses its behavior. Topical coverage includes first and second order systems, transfer functions for both open and closed loop systems, and frequency response methods. Emphasis is upon mechanical devices. Hydraulic and electrical systems are included to stress analogous nature of all dynamic systems. *Three semester hours.*

E708 *Heat Transfer I.* An introductory study of engineering heat transfer, with emphasis on conduction and radiation. Topics include the theory of steady-state conduction in one, two and three dimensions; transient conduction; radiation between black surfaces; radiation between gray surfaces; analytical methods, numerical methods, electric analogies. *Three semester hours.*

E709 *Reactor Physics I.* Fundamental aspects of atomic and nuclear structure are given emphasis. Natural and induced radioactivity, laws of radioactive decay, including a demonstration of half life, binding energy and nuclear stability, compound nucleus, liquid drop model and theory of fission, cross sections including a demonstration of total cross section, Maxwell-Boltzmann distribution of thermal neutrons, center of mass system and laboratory system mechanics, slowing down density, resonance escape probability, thermal utilization factor, and the four-factor formula for k (infinite). Brief introduction to the meaning of fermi age and diffusion length, both the physical meaning and the mathematical derivation of these probabilities of nonfast and nonslow leakage of neutrons. Material and geometric buckling. Finally, the diffusion equation and the critical equation applied to a thermal reactor. *Three semester hours.*

E710 *Reactor Physics II.* The interaction of nuclear radiations with matter involving alphas, betas, and a basic mathematical approach to the photoelectric effect, Compton scattering, and pair production of gamma radiations. Health physics and the biological effects of radiation. Radiation detection and measurement. Basic attenuation of radiations exponentially and by the inverse square laws. Laboratory work in the nucleonics laboratory involving basic training with scalers, flux mapping of the sub-critical assembly both with foils and the BF_3 probe. *Three semester hours.*

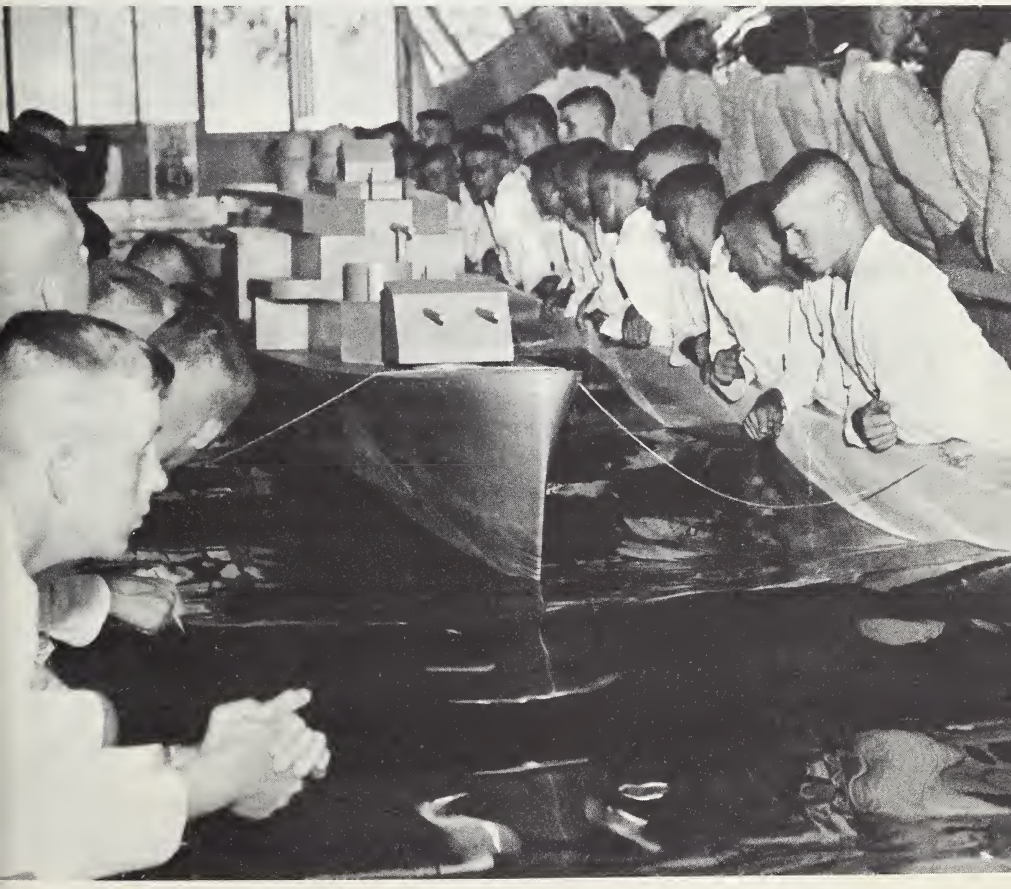
E731 *Aeronautical Structures.* An application of the elementary principles of solid mechanics to the lightweight structures of airborne systems. Topics include statically determinate analyses of coplanar and space structures, material properties, load transmissions in beams, analyses of members in tension compression, bending, and torsion. This course is a part of an academic major program which is available to the class of 1966 and subsequent classes. *Three semester hours.*

E732 *Aerodynamics I.* A specific development of the foundations of aerodynamics, with emphasis on concepts and mathematical analysis including the use of vectors. Topics include fluid properties, flow kinematics and dynamics, flow about a body, thin airfoils, finite wing, and an introduction to compressible fluids. Wind tunnel laboratory exercises are oriented to airstream calibrations. This course is a part of an academic major program which is available to the class of 1966 and subsequent classes. *Four semester hours.*

E801 *Naval Architecture—Hydrostatics.* Hull form types; ship geometry, nomenclature, and hydromechanic parameters; form coefficients; hull form delineation; fairing and lofting practices. Form calculations; methods of determining areas, volumes, moments. Computations for displacement, center of buoyancy, center of gravity, and wetted surface. Preparation of hydrostatic curves; floodable length curves; watertight subdivision. *Three semester hours.*

E802 *Naval Architecture—Hydrodynamics.* A basic study of ship's hydrodynamics with particular emphasis upon flow phenomena and surface resistance, including the concepts and problems associated with submerged control surfaces, hydrofoils, and propeller theory. Laboratory work includes exercises and calculations on towing tank calibration, model resistance, Taylor's Standard Series, determination of Shoenheer Line and effective horsepower, controlled-wave resistance testing, and hydrofoil model computations. *Three semester hours.*

Tow Tank for Ship Models



E803 *Aerodynamics I.* The first of a two-course sequence which is the culmination of work toward an aeronautical engineering specialization for the class of 1965. Specifically the first course is literally aerodynamics, the study of the relative motion of air. Emphasis is placed on orienting the student's knowledge toward aeronautical science and on the specification, modification, and extension of the classic theories that allow applications to current developments. Topics include the standard atmosphere; compressible, viscous, and potential flows, airfoil and wing theory; and drag. Subsonic wind tunnel exercises include measurement techniques; airstream uniformity, angularity, and turbulence; and finite wing characteristics. This course is available to the class of 1965 only. *Three semester hours.*

E804 *Aerodynamics II.* The continuation of the study of relative motion of air, with emphasis on applications of theory to the science of flight. Specifically, a knowledge of solid and fluid mechanics is developed to allow a comprehension of how flight is possible. Topics covered include aircraft propulsion, aircraft performance, and longitudinal stability and control. Subsonic wind tunnel exercises include high lift devices, tare and interference measurements, drag buildup of an airplane, and trim and stability of an airplane. This course is available to the class of 1965 only. *Three semester hours.*

E805 *Heat Transfer II.* A continuation of Heat Transfer I, with emphasis on convection. Topics include principles of fluid dynamics necessary for the study of convective heat transfer; free convection; forced convection through and over tubes; heat exchanger design; aerodynamic heating; mass transfer. *Three semester hours.*

E807 *Gas Power Propulsion I.* An introduction to the dynamics, thermodynamics, and thermochemistry of gas power propulsion, including molecular characteristics of gases, thermodynamics of compressible flow and combustion processes, thermochemical equilibrium and analysis of gaseous combustion products with dissociation. *Three semester hours.*

E808 *Gas Power Propulsion II.* Thermodynamic and thermochemical analysis of ideal and real gas power propulsion cycles, including gas turbine (open and closed, with laboratory analysis), ramjet, turbojet, pulsejet, turboprop, liquid and solid fueled rocket. *Three semester hours.*

SM902 *Science Research Project.* A creative, scientific research project in the field of the student's interest, approved by the science research adviser in the cognizant department. The project may be undertaken only by those in the third year of participation in the Advanced Science and Mathematics Seminar. *Three semester hours.*

ENGLISH, HISTORY, AND GOVERNMENT DEPARTMENT

The mission of the English, History, and Government Department is to educate the midshipman as a discriminating individual with an understanding of history, government, economics, and literature, and to develop in him a mature ability to read with comprehension and appreciation, to write with clarity and style, and to speak with conviction and poise. In support of this mission, the department offers some 35 electives in addition to the standard course of 24 semester hours required of every midshipman.

Foreign Affairs Conference

FOURTH CLASS YEAR

Summer

H100 *Naval History: Traditions and Leadership.* Familiarization with the library and drill in the use of its facilities; selected reading; reading assignments in naval history and traditions, with supplemental lectures, and an examination.

First and Second Semesters

H101 & 102 *Composition and Literature.* Primary emphasis is on developing efficiency in reading and in oral and written communication. Reading and discussion of selections from major American writers (first term) and major British writers (second term), with frequent quizzes. Weekly themes based on the readings and exemplifying basic forms of exposition: Definition, classification, analysis, argument, criticism, comparison and contrast, etc. Individual conferences on composition in class. Practice in the use of the dictionary, social and naval correspondence, and public speaking. Library visits, with drill in research techniques. *Six semester hours.*

H103 & 104 *Composition and Literature, Advanced Course.* This course is designed for midshipmen with exceptional aptitude for composition and literature. The general objectives are the same as those of the basic course except that there is more emphasis on critical writing. The major types of American and English literature are studied in the first and second terms respectively. These major types are represented by complete works of outstanding men of letters. *Six semester hours.*

THIRD CLASS YEAR

First Semester

H201 *Modern European History.* The objective of the course is to give the midshipmen a knowledge of European historical development and overseas impact of events in Europe since 1789. Lectures and collateral readings broaden the scope of the textbook. *Three semester hours.*

Second Semester

H202 *U.S. Foreign Policy and Geography.* The course objective is to teach the midshipmen the diplomatic history of the United States and the principal aspects of past and present U.S. foreign policies. The lessons in geography are designed to develop an appreciation of geographic forces in world affairs. *Three semester hours.*

SECOND CLASS YEAR

Summer

H300 *Speech.* This course emphasizes speech composition and platform performance with the general objective being to improve the midshipmen's proficiency in oral expression. Attention is paid to *ex tempore* speaking, debate technique, basic elements of parliamentary law, conference procedures, and particularly to presentations and briefings. *One semester hour.*

First Semester

H301 *U.S. Government.* The objectives of this course are: (1) to implant in the midshipmen an understanding of the basic concepts of American democracy; (2) to establish an understanding of the Constitution; (3) to familiarize the student with the structure and functions of his government and the forces and factors which influence its operation; and (4) to compare his government with other types of government. *Two semester hours.*

Second Semester

H302 *Economics.* Laws of economic behavior, American economic institutions, the role of government in the economy in peace and war, elements of personal finance. *Two and three-quarters semester hours.*

H304 *Economics, Advanced Course.* This course is designed for midshipmen who have demonstrated particular proficiency in the social sciences. The objectives are similar to those of the basic course, but the level of analysis is commensurate with the superior abilities of the students. Some emphasis is given to economic methodology and to the history of economic thought. *Two and three-quarters semester hours.*

FIRST CLASS YEAR

First Semester

H401 *Naval History.* The objective of this course is to provide the midshipmen with information basic to their profession concerning: (1) the development of naval ships and weapons; (2) the evolution of naval tactics and amphibious doctrine; (3) the reasoning behind historic strategic decisions; (4) the influence of sea power upon history; and (5) the qualities of character and professional competence which have made great naval leaders. *Three and one-half semester hours.*

Second Semester

H402 *Advanced Composition and Literature.* The objective of this course is to develop the midshipman's intellectual maturity: (1) by exploring some of the problems of human existence; (2) by deepening his understanding of human personality; (3) by sharpening his perceptions of literary values through writings and discussion; and (4) by improving his powers of oral and written expression. Course work involves the reading and the discussing of at least five masterpieces selected by the instructor from world literature, past and present. The readings and the discussions in any one class section are related to a single thematic objective. *Three and three-quarters semester hours.*

First and Second Semesters

Research Paper. The research paper project is designed to introduce the midshipmen to the scientific method of analyzing the materials of history, to familiarize them with research methods, and to require of them an extended piece of individual work in which they combine their knowledge of history and their skill in composition. The research paper project begins early in the first term and extends well into the second.

After-Dinner Speaking. Throughout First Class year, small dinners are given under the auspices of the English, History, and Government Department, with the primary objective of providing a setting for midshipmen to deliver after-dinner speeches under realistic circumstances. Guests of honor and faculty members are present. Each member of the First Class participates in at least two of these dinners.

After-Dinner Speaking

ELECTIVE COURSES

H502 *Readings in the Literature of Democracy.* A study of selections of literary merit dealing with ideas basic to democratic government: books, tracts, essays, letters, documents, speeches, and public pronouncements. Literary qualities of the selections are emphasized. This course carries credit leading to a major in either Literature or Social Studies. *Three semester hours.*

H601 *Modern American Literature.* Readings from the major writers of American fiction, poetry, and the drama since 1920. Especial attention to representative works of such authors as Hemingway and Faulkner, Eliot and Frost, O'Neill and Williams. *Three semester hours.*

H602 *Modern British Literature.* Readings from the major writers of British fiction and poetry since 1900. Especial attention to representative works of such authors as Conrad, Joyce, Huxley, Waugh, Greene, and Cary. *Three semester hours.*

H604 *Classical Literature.* This course is designed to give the midshipmen an introduction to the important literature of classical Greece and Rome, such as the works of Homer, Sophocles, Virgil, and Ovid. Some emphasis is also placed on the mythology and religion of the age. *Three semester hours.*

H605 *U.S. History.* A survey of the principal political, economic, and social ideas and institutions of the American people since 1789. Attention is also paid to geographical considerations, religious currents, progress in literature and the arts, and the development of foreign policies. Emphasis is placed upon achieving a broad picture of the foundations of current attitudes toward domestic problems and foreign affairs and upon the characteristics of the democracy which American military personnel are sworn to defend. *Three semester hours.*

H606 *History of Russia.* A chronological introduction to the political, cultural, social history of Russia from the founding of the Moscow principality through its expansion into the present Soviet Union. The growth of national consciousness, drive, and objectives will be emphasized, together with the factors fostering the anomalous survival of the principle of autocracy from the 13th century Mongol invasion. *Three semester hours.*

H607 *History of Europe, 1500–1815, from Renaissance through Napoleon.* A survey course in which the following major developments will be studied: the rise of Spain, England, and France as national states, the development of absolute monarchy, the era of oceanic exploration and of overseas colonization, the rise of capitalism, the Protestant Revolt or Reformation, the Scientific Revolution, the development of constitutional government, the rise of Russia and Prussia, the French Revolution and Napoleon. Readings presenting differing points of view will be used as a basis of discussion. *Three semester hours.*

H609 *U.S. Economic History.* A study of the American economy from colonial times to the present, with special emphasis on the interrelations between the ways Americans have made a living and their social and political attitudes, on America's role in the world economy, and on the rise of the large corporation. *Three semester hours.*

H703 *The World Since 1914.* This course emphasizes the backgrounds and causes of World Wars I and II, the development of totalitarianism, the failure of collective security in the interwar period, the diplomacy of coordination during World War II, the United Nations, and significant trends in the Far East, Middle East, Africa, and Europe after World War II. *Three semester hours.*

H704 *Comparative Government and Comparative Economic Systems.* A comparative study of the governments of England, France, Russia,

China, and India, with full attention to civil rights and economic controls as well as the machinery of government. The approach is dynamic rather than static. The implications of the various philosophies of government in foreign relations are considered. *Three semester hours.*

H706 *Communism: Theory and Practice.* A study of the philosophy of Communism from the writings of Engels, Marx, Lenin, and Stalin; history of the Internationals; the role of the Comintern and the "international party"; relations of the Soviet Union with radical parties outside Russia, and with European Social Democratic parties; policies in the satellite nations; the security problem in the Western democracies. *Three semester hours.*

H708 *The Far Eastern Relations of the United States.* A consideration of the development of the diplomatic, cultural, and economic relations of the United States and the Far East. Special emphasis is placed on developments since 1850, particularly upon the interaction of the foreign policies of the United States with those of the major Far Eastern powers as the latter were stimulated by imperialism, nationalism, industrialism, democracy, and Communism. *Three semester hours.*

H709 *Political Theory.* The philosophic bases of the various forms of government, with emphasis on the roots of democracy; the political writings of Plato, Aristotle, St. Thomas Aquinas, Hobbes, Locke, Montesquieu, Hamilton, Jefferson, Madison, Hegel, Nietzsche, Pareto, Wilson; the great documents—Magna Carta, the Declaration of Independence, the U.S. Constitution, the Atlantic Charter, etc.; legal codes; the Common Law. *Three semester hours.*

H710 *Modern Middle Eastern History and Problems.* This course is designed to provide an understanding of the current international tensions and problems centered in the Middle Eastern area. A thorough grounding will be given in the essential elements of Middle Eastern history, culture, and sociology, and then the problems of internal and international political tensions in the area will be studied in detail. Special emphasis will be placed upon problems of naval and diplomatic importance including Middle East oil and the penetration of Soviet influence into the area. *Three semester hours.*

H711 *Major British Writers, 14th–18th Centuries.* Intensive study of selected works of principal figures in the literature of England: Chaucer, Spenser, Milton, Pope, and Johnson; their thought and art, their historical background, their significance as representatives of their times, and their contributions to the culture of the English-speaking nations. *Three semester hours.*

H712 *Major British and American Writers, 19th and 20th Centuries.* Intensive study of selected works of principal figures in the literature of England and the United States in the 19th and 20th centuries: Wordsworth, Emerson, Hawthorne, Melville, Dickens, Tennyson, Browning, Poe, Whitman, Joyce, and Eliot; their thought and art, their historical background, their significance as representatives of their times, and their contributions to the culture of the English-speaking nations. *Three semester hours.*

H713 *Shakespeare and His Contemporaries.* Intensive study of the major dramatic works of Shakespeare against the background of Tudor and Stuart life and literature, especially the plays of Shakespeare's fellow dramatists of the English Renaissance. Special consideration of Shakespeare's thought, dramatic development, and literary stature, particularly as revealed by comparison of his plays with the dramatic works of his contemporaries. *Three semester hours.*

H801 *Advanced Economics and Problems of Defense Planning.* Intermediate level economic analysis, with emphasis on policy problems in war and cold war: production and manpower programing, allocating of materials, stockpiling, wage and price controls, rationing, wartime fiscal and monetary policies. *Three semester hours.*

H803 *Introduction to Philosophy and Logic.* A brief study of the problems and methods of philosophy and the solutions suggested by various philosophers. Included is a nontechnical introduction to the analysis of deductive and inductive reasoning, sound definition, and logical fallacies. *Three semester hours.*

H805 *History of Latin America.* A survey designed to provide reasonable familiarity with the origins and growth of our southern neighbors. The complex threads of independence won by viceroyalties, fragmentation by nationalism, and the rise of national leaders will be subordinated in emphasis to the development of the forces shaping Pan-Americanism. The significance for Latin America, the United States, and the world of the ideal of *La Patri Grande* will be explored. A reading knowledge of Spanish or Portuguese is desirable but not required. *Three semester hours.*

H806 *Elements of Law.* Introduction to jurisprudence. The essentials of the law of crimes, contracts, torts, agency, real and personal property, domestic relations, testaments, negotiable instruments, and taxation, with a view to familiarizing the student with those branches of the law he is most likely to encounter in his role as a citizen and officer of the Armed Forces. *Three semester hours.*

H807 *International Relations.* This course deals with the present-day problems confronting U.S. diplomacy in Europe, the Far East,

the Middle East, and Latin America. It provides extensive opportunity for the study of policy as well as appropriate diplomatic strategy to be applied as possible solutions to the problems. *Three semester hours.*

H808 *U.S. Military History and Policy.* A survey of U.S. military history and policy from colonial times to the present. It provides extensive opportunity to analyze major land and pertinent sea campaigns, problems of logistics, the implementation of national policy by the military forces and the relationship between the U.S. military staffs and the civil government, the effect of air power on strategy and concepts of nuclear warfare. *Three semester hours.*

H810 *Economics of Labor Relations.* This course is designed to give the midshipman a general survey of the field of labor relations. A study is made of labor history in the United States, the organization of unions, the economics of the labor market, and the relationship between government and labor. Special attention is given to labor-management relations and current problems. *Three semester hours.*

H901 *Seminar in Literature I* (*Representative Contemporary Novelists*). Intensive study of selected works of six modern novelists, Moravia, Camus, Silone, Faulkner, Greene and Malraux, as representatives of contemporary points of view on the political, social and ethical problems of the 20th century. Discussions, collateral readings, reports, individual reading projects. *Three semester hours.*

H902 *Seminar in Literature II* (*Representative Contemporary Playwrights, Poets or Short Story Writers*). Intensive study of modern drama, poetry, or short fiction, American, British and Continental, as representative of contemporary points of view on the political, social and ethical problems of the 20th century. (Only one literary type will be studied in any one year, as determined by the interest of the midshipmen enrolled.) Discussions, collateral readings, reports, individual reading projects. *Three semester hours.*

H903 *Seminar in History.* Directed individual investigation and group discussion in special fields of interest in European and United States history. This work will be accomplished by readings and lectures on the nature of historical research, the problems of causation and of interpreting evidence, and the major schools of historical interpretation. *Three semester hours.*

H904 *Seminar in Russian Military and Naval Doctrine.* The evaluation of Russian strategic and tactical concepts, the interrelationship of armed services, the development of material, education and training, and illustrative campaigns. Emphasis will be placed upon outstanding Russian formulators and practitioners of military and naval doctrine.

The influence of Stalin upon Soviet military doctrine and its differences from conventional concepts are emphasized. A reading knowledge of the Russian language is desirable but not required. *Three semester hours.*

H905 *Seminar in Philosophy of War.* A survey of the ethical and operational problems involved in war. It provides for the study of the causes and nature of war, an examination of limited and absolute war and the relationship between military staffs and civil governments, and an analysis of the writings of the leading men on the subject. *Three semester hours.*

Philosophy of War Seminar

H906 *Seminar in Naval History.* Designed to provide opportunity to pursue interest aroused in a phase of naval history. A midshipman, with the supervision of the instructor, will develop his own project of reading or research. The group will discuss oral or written reports submitted at such intervals as will keep discussion fruitful in exploring those problems or aspects of naval history which may be involved. *Three semester hours.*

H912 *Seminar in Social Studies.* An introduction to research in specific fields of the Social Studies. The work will be accomplished by readings, lectures, and seminar discussion on the nature and techniques of research, the problems of causation and of interpreting evidence,

and the major schools of interpretation. Students may concentrate in history, political science or economics. *Three semester hours.*

H913 *Seminar in History of Technology.* A survey of the evolution of technology from the time of the Egyptians to the present. Major personalities in the field and significant scientific ideas and events are highlighted through readings, lectures, and seminar discussions. Emphasis is placed on the role of engineering in the development of civilization. *Three semester hours.*

H914 *Seminar in the Development of U.S. Institutions.* This course deals with American institutions and their reciprocal relationships within American society. Institutions to be studied by means of a text, reports, short papers, and roundtable discussion are those affecting politics, economics, social organization, domestic and foreign policy, and intellectual life. Following his interest, the student could, for example, study federalism, political party structure, capitalism, the organization of business and labor, class structure, military structure, educational system, the peace movement, slavery, 19th century Utopian reform. *Three semester hours.*

EXECUTIVE DEPARTMENT

The Commandant of Midshipmen has cognizance over training and education conducted in the Executive and Physical Education Departments of the Naval Academy. He serves as Head of the Executive Department. The Executive Officer of Bancroft Hall is his principal assistant. Under the direction of the Commandant, the Head of the Physical Education Department supervises physical education drills and the intramural sports program.

The Executive Department prepares the midshipmen for the exercise of command. The specific objectives of the Executive Department are: (1) To develop character and proper military and personal habits; (2) to inculcate discipline and to foster the subordination of self to a common cause; (3) to develop in each midshipman an appreciation and knowledge of and motivation for his future role as a naval officer through personal example and practical application of the psychological principles of human behavior and the principles and techniques of leadership.

The officers of the Executive Department work and live in close contact with the midshipmen so that they can further the development of personal and military character through precept and example, counsel and guidance, and, when required, corrective or disciplinary action.

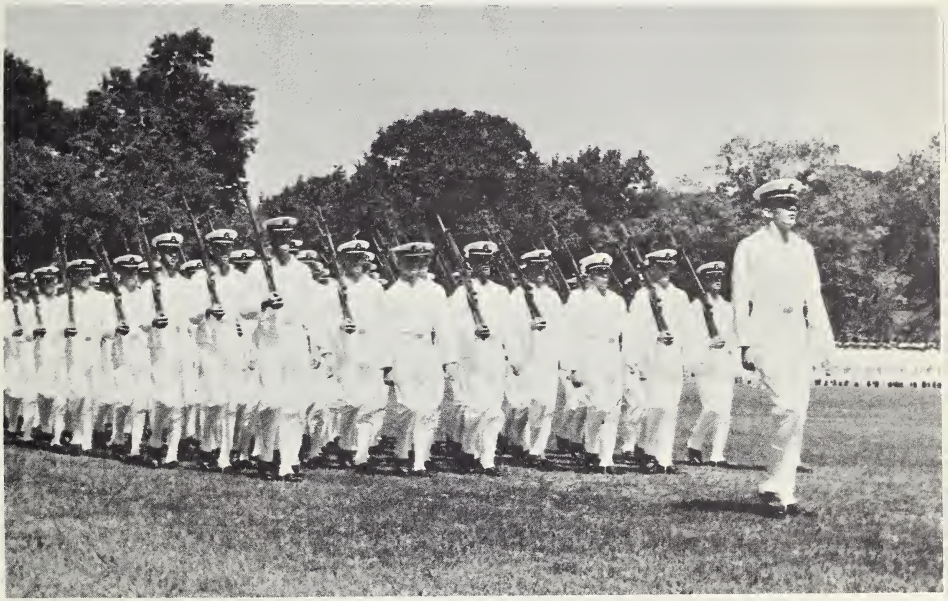
FOURTH CLASS YEAR

Summer

Orientation and Indoctrination. An elementary course to orient the new midshipman in the naval service and to indoctrinate him with the way of life at the Naval Academy, its mission, ideals, standards, traditions, customs, and the duties required of him.

First and Second Semesters

Infantry drills, watch standing, and continued indoctrination. *One semester hour.*



Plebe Infantry Drill

THIRD CLASS YEAR

First and Second Semesters

Infantry drills, watch standing, elementary military responsibilities *One semester hour.*

SECOND CLASS YEAR

First and Second Semesters

Infantry drills, watch standing, increased military responsibilities. *One semester hour.*

Second Semester

Personal Finance. A noncredit study of the principles of insurance, benefits available from the government to the survivors of military personnel, personal insurance programs and investments, and personal financial planning. Course includes budget planning for the junior officer. A review lesson is assigned during the First Class Year.

FIRST CLASS YEAR

First and Second Semesters

Infantry drills, watch standing, and performance of specific responsible duties in the Brigade Organization involving the exercise of leadership and command. *One semester hour.*

FOREIGN LANGUAGES DEPARTMENT

The Foreign Languages Department offers courses in French, German, Italian, Portuguese, Russian, and Spanish. Through the required basic course, it aims to provide every midshipman with—

(1) a working knowledge of one foreign language, with emphasis on conversation;
(2) basic knowledge of the area, customs, and civilization of the peoples whose language is being studies; and
(3) basic knowledge of the nature of language, both for its intrinsic value as a liberal study and as a foundation for future language learning (either advanced work in the first language or acquisition of new languages).

The department also offers a well-rounded electives program, in which a midshipman may continue his first language with advanced work in language, literature, and area study, or acquire a second language.

FOURTH CLASS YEAR

First and Second Semesters

L101 & 102 *French, German, Italian, Portuguese, Russian, Spanish.* Development of listening comprehension, speaking, reading, and writing skills. Stresses oral practice. Includes essentials of grammar. Conversations and readings deal with everyday situations as well as cultural and area materials. Tape-recorded drills integrated with texts and daily assignments. Advanced sections for qualified midshipmen. *Six semester hours.*

Foreign Language Trainer

THIRD CLASS YEAR

First and Second Semesters

L201 & 202 *French, German, Italian, Portuguese, Russian, Spanish.* Brief review of grammar; development of speaking and writing ability based on readings of intermediate difficulty selected from stories, plays, contemporary writings, and naval phraseology. Advanced sections for qualified midshipmen. *Five semester hours.*

ELECTIVE COURSES

French

L101 & 102 *Beginning French.* Offered to Third, Second, and First Class midshipmen as a second language. No credit granted unless both terms are satisfactorily completed. *Six semester hours.*

L201 & 202 *Intermediate French.* No credit granted unless both terms are satisfactorily completed. *Five semester hours.*

L701F & 702F *Advanced Written and Oral French.* Aims to develop accuracy and ease in the active use of French. Provides ample practice in writing and speaking. Includes vocabulary building and

systematic review of grammar. Two terms, but each term may be taken independently. *Three semester hours each term.*

L711F & 712F *Advanced French Readings and Conversation.* Advanced conversation and discussions based on readings selected from cultural and other modern writings. Includes some composition. *Three semester hours each term.*

L703F & 704F *Readings in French Literature.* Plays, novels, poems and anthology selections by such famous authors as: Corneille, Racine, Molière, Marivaux, Voltaire, Rousseau, Hugo, Lamartine, Balzac, Flaubert, Baudelaire, Zola, Proust, Gide, Mauriac. Ample practice in conversation. Two terms, but each term may be taken independently. *Three semester hours each term.*

L801F *Contemporary French Literature.* Selected works of such influential modern authors as Proust, Mauriac, Malraux, Romains, Gide, Camus. Ample practice in conversation. *Three semester hours.*

L802F *Contemporary French.* Readings and discussions designed to provide knowledge and understanding of the French people and of French national life today. Ample practice in conversation. *Three semester hours.*

German

L101 & 102 *Beginning German.* Offered to Third, Second, and First Class midshipmen as a second language. No credit granted unless both terms are satisfactorily completed. *Six semester hours.*

L511G & 512G *Scientific German.* A beginning course in reading and translation, intended for those who have not studied this language at the Naval Academy, and who desire only a reading knowledge of scientific German. No credit granted unless both terms are satisfactorily completed. *Six semester hours.*

L201 & 202 *Intermediate German.* No credit granted unless both terms are satisfactorily completed. *Five semester hours.*

L701G & 702G *Advanced German.* Selected readings, magazines and periodicals, to develop skill and facility in writing and fluency in oral discussion. Systematic drill to enable the midshipman to broaden his vocabulary range in all fields. *Three semester hours each term.*

L705G & 706G *German Naval Histories and Novels.* Readings to develop skill in naval terminology and broaden the knowledge of the midshipman in his special field. Basically World Wars I and II. (Each term may be taken independently.) *Three semester hours each term.*

L707G & 708G *German Literature of the Twentieth Century.* Literary movements and selected authors: Gerhart Hauptmann, Thomas Mann, Hermann Hesse, Wolfgang Borchert, Franz Kafka, Elisabeth Langgasser, Ernest Wiechert, and others. *Three semester hours each term.*

L801G & 802G *Goethe, Schiller and Lessing.* Selected works from the three great writers of German literature. Their influence on the literature and history of the times will be emphasized. *Three semester hours each term.*

L803G & 804G *German Literature Since Goethe.* An introduction to the German literary movements from the Liberal Age to the present. Representative works of the more important authors of each genre and period will be read and discussed. *Three semester hours each term.*

Italian

L101 & 102 *Beginning Italian.* Offered to Third, Second, and First Class midshipmen as a second language. No credit granted unless both terms are satisfactorily completed. *Six semester hours.*

An Italian Naval Officer Talks About His Homeland

L201 & 202 *Intermediate Italian.* No credit granted unless both terms are satisfactorily completed. *Five semester hours.*

L701I & 702I *Advanced Italian.* Practice in original oral composition and conversation. Selected reading and periodicals provide sources of drill materials. *Three semester hours each term.*

L801I *The Age of Petrarch and Boccaccio.* This course presents the development of the lyric and the short-story with representative readings in each. *Three semester hours.*

L802I *Dante and His Times.* The Divina Commedia is read and analyzed in the light of the literary, political and religious ideals of the Middle Ages. *Three semester hours.*

L803I & L804I *Readings in Italian Literature.* Selected works of such influential authors as Ariosto, Tasso, Metastasio, Goldoni, Parini, Alfieri, Foscolo, Manzoni, Leopardi, Pascoli, D'Annunzio. Ample practice in conversation. *Three semester hours each term.*

Portuguese

L101 & 102 *Beginning Portuguese.* Offered to Third, Second, and First Class midshipmen as a second language. No credit granted unless both terms are satisfactorily completed. *Six semester hours.*

L201 & 202 *Intermediate Portuguese.* No credit granted unless both terms are satisfactorily completed. *Five semester hours.*

L701P & 702P *Advanced Portuguese.* Advanced study of the language with practical written and oral work leading to increased facility in the use of Portuguese. Selected readings and current periodicals will be used as source materials. *Three semester hours each term.*

L703P *Introduction to Portuguese Civilization and Literature.* Portuguese geography, history, economy, and arts—general readings. Portuguese literature—selections from Gil Vicente, Camoes, Garrett, etc. Informal lectures. Discussion. *Three semester hours.*

L704P *Introduction to Brazilian Civilization and Literature.* Brazilian geography, history, economy, and arts—general readings. Brazilian literature—selections from Gilbert Freyre, Verissimo, Benedetti, etc. Informal lectures and discussion. Consideration of contemporary problems in Portugal and Brazil and relations of these countries with the United States. Oral presentation on these and allied subjects. *Three semester hours.*

L801P *The Brazilian Short Story and Theatre.* Selected readings in the short story and the theatre from contemporary Brazilian writers. Monteiro Lobato, Pereira de Almedia, Callado, etc. Informal lectures. Discussion. *Three semester hours.*

L802P *Contemporary Naval, Technical, and Nontechnical Portuguese.* Selected readings on naval and technical subjects and readings in current nontechnical periodicals. Preparation for oral presentations and briefings covering situations in which a naval officer might find himself in Portuguese-speaking areas. *Three semester hours.*

Russian

L101 & 102 *Beginning Russian.* Offered to Third, Second, and First Class midshipmen as a second language. No credit granted unless both terms are satisfactorily completed. *Six semester hours.*

L201 & 202 *Intermediate Russian.* No credit granted unless both terms are satisfactorily completed. *Five semester hours.*

L703R & L704R. *Advanced Russian.* This course aims to carry the learner beyond the basic 2-year minimum program. Review of basic patterns and writing practice will be continued with analysis and discussion of standard literary works. Conversational facility will be developed by means of discussion, debate, and oral reports. *Three semester hours each term.*

L705R & L706R. *The Soviet Press.* An introduction to the style and content of the Soviet press. Current Russian publications will be read and analyzed with attention to the selective nature of the Soviet press. In addition to giving insight into current problems of Soviet policy, this course aims to prepare the midshipman for research in the field of Russian and Soviet affairs. *Three semester hours each term.*

L711R & 712R *Scientific Russian.* A reading course in current Soviet scientific literature. Material will be selected from current periodicals, textbooks and encyclopedias. Special attention will be devoted to the administrative framework of theoretical and applied research. Two terms, but each term may be taken independently. *Three semester hours each term.*

L801R *Russian History in Literary Works.* Study of historical epochs through dramas and tales. Reports and discussions in Russian. *Three semester hours.*

L802R *The 19th Century Russian Novel.* Readings from the works of Leo Tolstoy, Turgenev, and Dostoevsky. Reports and discussions in Russian. *Three semester hours.*

L803R *Anton Chekhov.* Study of selected plays and short stories of Chekhov. Objective is to increase mastery of contemporary Russian vocabulary and to develop an understanding of Chekhov's world. *Three semester hours.*

Spanish

L101 & 102 *Beginning Spanish.* Offered to Third, Second, and First Class midshipmen as a second language. No credit granted unless both terms are satisfactorily completed. *Six semesters hours.*

L201 & 202 *Intermediate Spanish.* No credit granted unless both terms are satisfactorily completed. *Five semester hours.*

L701S & 702S *Advanced Written and Oral Spanish.* For students who already have a basic knowledge of Spanish grammar and experience in spoken language. This course is intended to develop facility in writing and speaking correct and concise Spanish. Discussions, short speeches and oral and written reports in Spanish. *Three semester hours each term.*

L711S & 712S *Advanced Spanish Readings and Conversation.* Advanced conversation and discussions based on readings selected from cultural and other modern writings. Includes some composition. *Three semester hours each term.*

L703S *Survey of Spanish Literature.* First Term. A background course to give the student an understanding of the main features of the great literary movements of Spain, with careful reading and critical discussion of the major literary creations. Discussions, written and oral reports in Spanish. *Three semester hours.*

L704S *Survey of Spanish Literature.* Second Term. Continuation of first term, but may be taken independently. *Three semester hours.*

L802S *Contemporary Spanish Literature.* This course will present a study of important Spanish and Spanish American writers of the 20th century through the reading of representative stories, plays, essays, and poems. *Three semester hours.*

L803S & L804S *The Contemporary Spanish and Spanish-American Short Story.* This course offers to the advanced student the finest examples of Spanish and Spanish-American short stories. *Three semester hours each term.*

L805S & L806S *Survey of Spanish-American Literature.* This course presents a broad panorama of Spanish-American literature from its inception to the present day. *Three semester hours each term.*

L807S *Spanish Civilization.* The story of a 3,000-year-old civilization with emphasis on the most significant aspects of its history, culture, and politics. *Three semester hours.*

L808S *Spanish-American Civilization.* An area study including Mexico, Central America, the Caribbean, and South America. An orientation on early cultures, followed by study of the geography, resources, political history, institution and customs of selected countries. *Three semester hours.*

MATHEMATICS DEPARTMENT

The Mathematics Department develops in the midshipmen the fundamental skills of trigonometry, analytical geonometry, calculus, mechanics, differential equations, and selected modern topics, and the ability to apply them to analysis of mechanical, electrical, and fluid phenomena which are basic to the solution of naval technical problems. There are advanced sections for superior students in calculus, mechanics, and differential equations.

FOURTH CLASS YEAR

Summer

Plane Trigonometry. (For those midshipmen not offering trigonometry upon entrance) Definition of trigonometric functions of any angle, numerical value of functions of special angles, identities; slide rule solution of right triangles; functions of related angles; radians, graphs; functions of composite angles; law of sines, law of cosines; inverse trigonometric functions; trigonometric equations.

First Semester

M103 *Analytic Geometry and Calculus.* College algebra: complex numbers and theory of equations. Analytic geometry and calculus: concept of function; graphs of functions; limits and continuity; the derivative of a function; differentiation of algebraic, trigonometric and inverse trigonometric functions; applications of the derivative to velocity, acceleration, maxima, minima and related rates. The integral concept; the mean-value theorem; applications of the definite integral to area. Topics from analytic geometry including the straight line, conic sections and parametric representation. *Five semester hours.*

Second Semester

M104 *Analytic Geometry and Calculus.* Translation and rotation axes; differentiation of logarithmic and exponential functions; techniques of integration; applications of the definite integral to arc length, volumes, surface area, moments of mass distributions, centroids; polar representation; vectors; vector algebra; differentiation of vector functions; vector treatment of motion on a curve. *Five semester hours.*

THIRD CLASS YEAR

First Semester

M205 *Analytic Geometry and Calculus.* Analytic geometry and mean-value theorem and indeterminate forms, improper integrals, Newton's method; infinite series, including MacLaurin's and Taylor's series for expansion of functions; partial differentiation; multiple integrals and applications to area, volume, centroids, moments of inertia, etc.; separable differential equations of first order and linear differential equations with constant coefficients: Probability and statistics: sets; probability; probability distributions; moments; central limit theorem; testing of hypotheses. *Five semester hours.*

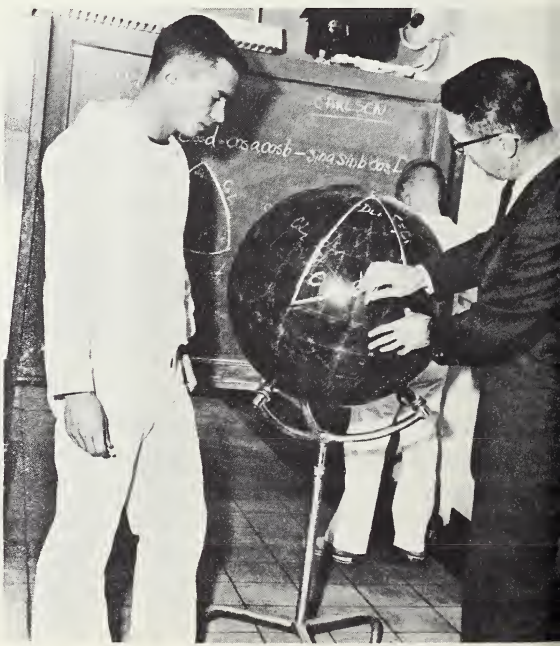
Second Semester

M202 *Mechanics.* Vector algebra including scalar and cross products; forces, couples and moments; vector calculus; kinematics of a particle and a rigid body; moving reference frames; dynamics of a particle and a rigid body; work and energy principle; impulse and momentum principle. *Five semester hours.*

SECOND CLASS YEAR

Summer

M300 *Spherical Trigonometry.* Geometry of the sphere; derivation of fundamental formulas; solution of right spherical triangles; orthographic projection; solution of oblique spherical triangles; application to terrestrial and celestial spheres. *One-half semester hour.*



Spherical Trigonometry

First Semester

M303 *Differential Equations.* Fundamental concepts; first order differential equations; linear differential equations; simultaneous differential equations; series solution of differential equations; partial differential equations; boundary value problems; Fourier series; applications. *Three and one-half semester hours.*

ELECTIVE COURSES

M502 *Fundamentals of Mathematics.* Logic, the number system, logic of algebra, mathematical induction, cardinal numbers, groups, linear programing, theory of games. *Three semester hours.*

M601 *Matrix Theory.* Algebra of matrices; transformations; bilinear forms; rank; systems of linear equations; quadratic forms; linear vector spaces; determinants; characteristic matrix, eigenvalues, eigenvectors. Prerequisite: M102 or M104. *Three semester hours.*

M602 *Modern Algebra.* Fundamental concepts; sets, relations, operations; rings; integers; fields; number fields; rational numbers, real numbers, complex numbers; groups; algebra of matrices. Prerequisite: M102 or M104. *Three semester hours.*

M604 *Numerical Analysis.* Practical solution of algebraic and transcendental equations: finite differences and their applications; numerical integration of initial value problems; numerical integration of ordinary boundary value problems. *Three semester hours.*

M606 *Probability and Statistics II.* Sampling theory for one variable; analysis of pairs of measurements; theoretical frequency functions for corelation and regression; the chi-square distribution; small sample theory (student's-t and F distribution); general principles for testing hypotheses and for estimation; nonparametric methods. *Three semester hours.*

M608 *Vector Analysis.* The geometry and algebra of vectors; vector calculus and the elements of the theory of vector fields; line and surface integrals; Stoke's and Gauss' theorems and their consequences; Maxwell's equations; applications to geometry and dynamics used throughout to illustrate the methods developed. *Three semester hours.*

M650 *Differential Equations II.* Similar to M303 but with extended coverage of applications of differential equations, series solutions of differential equations and partial differential equations. May be taken in lieu of but not in addition to M303. *Four semester hours.*

M712 *Advanced Calculus I.* The number system; sequences and series; functions of one variable; functions of several variables. *Three semester hours.*

M751 *Engineering Mathematics I.* Vector analysis: gradient, curl, divergence, line, surface, and volume integrals; potential theory; Fourier analysis: partial differential equations of mathematical physics; orthogonal sets; general boundary value problems; Sturm-Liouville problem; series solutions of second order differential equations; Gamma function; Bessel functions and applications. *Three and one-half semester hours.*

M752 *Engineering Mathematics II.* Laplace transformation and selected supporting topics from complex variable (analytic functions, residues, etc.). *Three semester hours.*

M802 *Introduction of Complex Variable.* Analytic functions: elementary functions; integrals; series; residues and poles; conformal mapping and applications; analytical continuation; Riemann surfaces. *Three semester hours.*

M803 *Advanced Calculus II.* Implicit functions; functional dependence; maxima and minima; vectors; the definite integral; line integrals; multiple integrals; uniform convergence. *Three semester hours.*

M861 *Linear Algebra.* An abstract treatment of vector spaces and linear transformation with application to algebra, analysis and geometry. *Three semester hours.*

M862 *Advanced Differential Equations.* A modern treatment of existence, uniqueness, oscillation, and comparison theorems. The theory of stability of solutions. Series developments and eigenvalue expansions for self adjoint equations. *Three semester hours.*

M864 *Topology.* Topics to include sets and functions, metric spaces, topological spaces, compactness, separation, connectedness, Stone-Weierstrauss theorems, and an introduction to Banach and Hilbert spaces. *Three semester hours.*

SM902 *Science Research Project.* A creative, scientific research project in the field of the student's interest, approved by the science research adviser in the cognizant department. The project may be undertaken only by those in the third year of participation in the Advanced Science and Mathematics Seminar. *Three semester hours.*

NAVAL HYGIENE DEPARTMENT

The goal of the Hygiene Department is to insure that each midshipman has a thorough knowledge of the fundamental principles of hygiene, sanitation, and preventive medicine, thus enabling him to carry out his future command responsibilities for the health and welfare of himself and his men.

FOURTH CLASS YEAR

Summer

Y100 *Fundamentals of Hygiene.* The midshipman is introduced briefly to the fundamentals of personal hygiene, including mental and physical hygiene and first aid.

FIRST CLASS YEAR

First Semester

Y101 *Naval Hygiene.* Instruction covering the human body as a functioning machine, the care of the human machine, and the effect of the various military environments. *Three-quarters semester hour.*

PHYSICAL EDUCATION DEPARTMENT

The Department of Physical Education aims to develop each midshipman's skill, strength, endurance, agility, and competitive spirit in order that he may be capable of surmounting severe physical hardships, be proficient in training and instructing others, and acquire useful habits of physical fitness.

Throughout the entire four years each midshipman is required to participate in a comprehensive and extensive program of intramural and intercollegiate sports. The objective of the program is to develop competitive spirit, confidence, and team work.

FOURTH CLASS YEAR

Summer

Physical Education Orientation and Indoctrination. Preliminary examinations in swimming, posture, and athletic ability. Testing in physical achievement with subsequent preparation of class grouping. Physical education drills in fundamentals of swimming, boxing, and wrestling. Indoctrination drills in lacrosse, fencing, soccer, gymnastics, crew, golf, tennis, squash racquets, volleyball, and track.

Boxing Class

First and Second Semesters

Physical Education. Fundamentals of badminton, soccer, swimming, boxing, wrestling, gymnastics, golf, tennis, posture, volleyball, basketball, handball, bowling, and squash racquets. Tests in applied strength, agility, swimming, boxing, wrestling, and gymnastics. *Two semester hours.*

THIRD CLASS YEAR

Physical Education. Continuation of instruction in swimming, boxing, wrestling, personal conditioning, tennis, golf, and gymnastics, and tests in applied strength, agility, swimming, boxing, and wrestling. *One semester hour.*

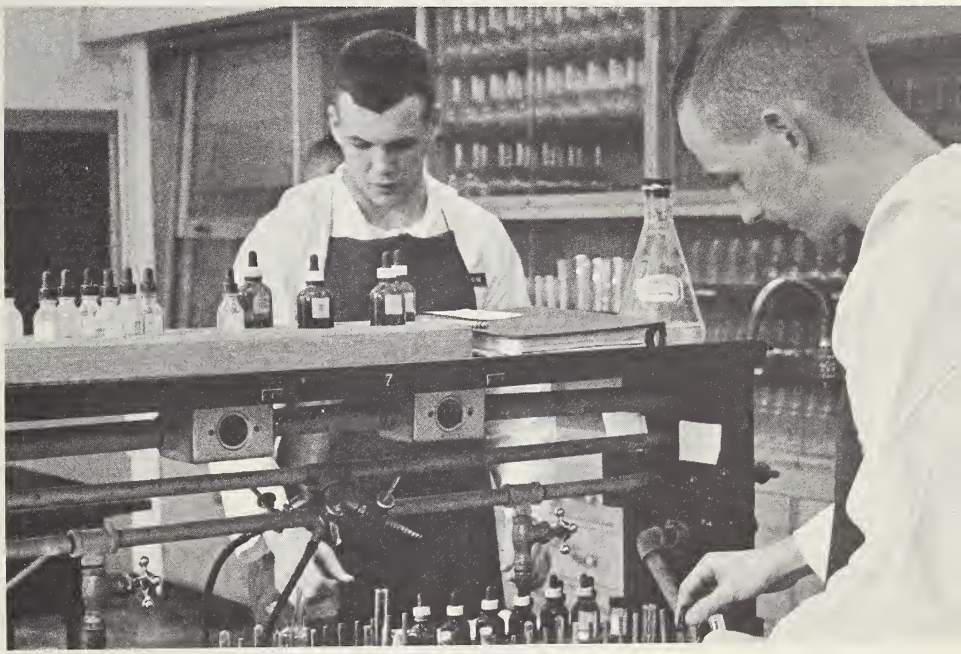
Body Building

SECOND CLASS YEAR

Physical Education. Advanced instruction in swimming, boxing, tennis, golf, handball, officiating, posture, and principles of personal conditioning, hand-to-hand combat, and volleyball. Tests in applied strength, agility, swimming, and boxing. *One and one-quarter semester hours.*

FIRST CLASS YEAR

Physical Education. Instruction in advanced swimming, hand-to-hand combat, personal conditioning, tennis, golf, badminton, and athletic administration. Tests in measurement activities. *Three-quarters semester hour.*



Chemistry Laboratory

SCIENCE DEPARTMENT

The Science Department presents the fundamental concepts of chemistry, physics, electrical engineering, and electronics, their application to present and future technology, and use of analytical methods in the solution of appropriate problems.

FOURTH CLASS YEAR

First and Second Semesters

S101 & 102 *Chemistry.* Fundamentals of chemical theory with a study of the properties of metals and nonmetals. Among specific topics studied in *chemical theory* are the laws of chemical change, atomic structure and the periodic table, kinetic-molecular theory and the gas laws, solutions, chemical equilibrium, ionization, electrochemistry, radioactivity, nuclear reactions and nuclear energy from fission and fusion reactions. *Metals* studied include the alkali and alkaline earth metals, aluminum, and iron. *Nonmetals* studied are limited to oxygen, hydrogen, halogens, nitrogen, and sulfur families, carbon, and simple carbon compounds. *Naval applications* include batteries, corrosion, water treatment, explosives, chemical warfare, the atomic bomb, the hydrogen bomb, and nuclear power plants for propulsion. Laboratory work includes both descriptive and quantitative experiments and a brief introduction to the principles of semimicro qualitative analysis. *Eight semester hours.*

THIRD CLASS YEAR

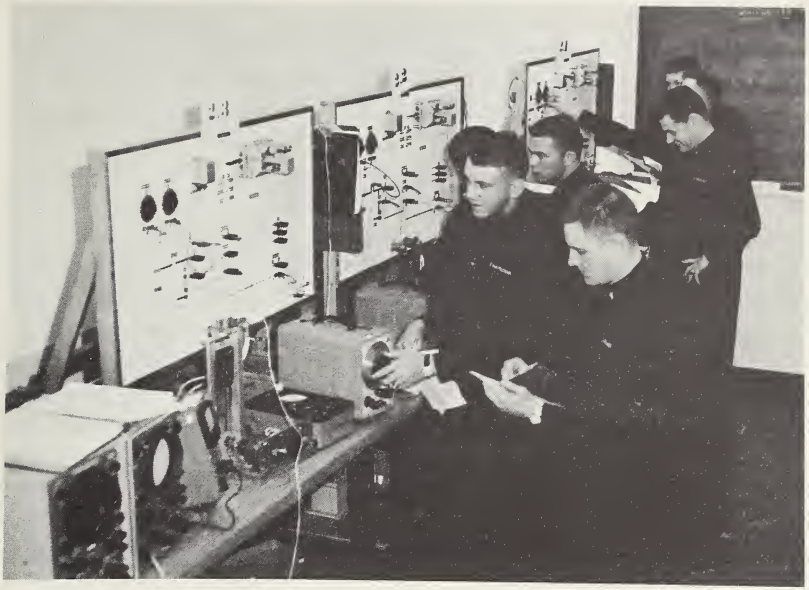
First and Second Semesters

S201 & 202 *Physics.* The course in general physics consists of four 50-minute recitations and one 2-hour laboratory period each week for two terms. Formal lectures are of the demonstration type and five or six are given each term. Emphasis in this basic course is placed upon the fundamental principles of classical physics. Contemporary applications of these principles are woven into a treatment in some depth of the traditional topics—mechanics, sound, heat, electricity and magnetism, and light—and the fundamental ideas of quantum physics are introduced. Vectors and the calculus are used throughout the course. *Ten semester hours.*

SECOND CLASS YEAR

First Semester

S303 *Circuit Analysis.* This is an introductory course in electric circuit analysis. Specifically, this includes the study of various methods of analysis such as loop and nodal analysis, superposition, Thevenin's and Norton's theorems. The circuit aspects of self and mutual inductance and capacitance are considered. Solutions of the transient and steady state are studied in some detail. The response to sinusoidal forcing functions is facilitated by the use of complex numbers, phasors and phasor diagrams. The work of the first term is concluded with an introduction to the concept of complex frequency. Emphasis is placed



Servoamplifier Analysis

on the student's ability to apply basic laws and principles in the analysis of circuits, his ability to solve the less complex cases and his interpretation of the solutions. *Three semester hours.*

Second Semester

S304 *Electromechanics.* The study and application of the concept of complex frequency is continued and phenomenon of resonance considered in some detail. A consideration of polyphase circuits presented just prior to the analysis of the synchronous machine and the induction motor concludes the formal study of circuit analysis.

The basic methods of electromechanical energy conversion and examples of general use are studied. Principles of conversion are analyzed with emphasis placed on the similarities among electromechanical devices rather than their differences. The transient and steady-state response of systems involving these devices is investigated with the aid of the Laplace transform as a tool of analysis. The problem of stability of closed-loop systems is considered briefly. *Three and three-fourths semester hours.*

FIRST CLASS YEAR

First and Second Semesters

S403 & S404 *Electronics.* Basic properties of electron tubes and transistors and their uses in circuits to perform the functions of recti-

fication, amplification, oscillation, modulation, waveshaping, etc. The subjects of transmission lines and antennas are also included. An introduction to noise, systems considerations and electronic compatibility is made. A 2-hour laboratory exercise is performed each week. *Seven semester hours.*

ELECTIVE COURSES

S605 & 606 *Organic Chemistry.* A study of the chemistry of the several distinctive classes of organic compounds, with attention paid to natural and synthetic sources of materials, to typical reactions of these classes of compounds, and to their uses. An important part of the ground covered is the presentation of fundamental chemical principles of structure and bonding; where feasible, detailed mechanisms of the reaction process are described. In the laboratory the students learn experimental techniques and carry out synthetic preparations of several organic compounds. Two lectures and two 3-hour laboratory periods. *Four semester hours each term.*

S608 *Development of Physical Theory.* The course in the development of physical theory is a primarily nonmathematical survey of the evolution of some basic physical concepts. Emphasis is placed upon historical development, influence of philosophy, and considerations of alternative formulations. The whole range of physics is not covered, but rather a few ideas are studied in some detail. Examples are: the conservation of energy, electric charge, temperature and heat, and formulation of the laws of motion. *Three semester hours.*

S701 *Atomic Physics.* This course is the same as S803, but without the laboratory. *Three semester hours.*

S702 *Nuclear Physics.* This course is the same as S804, but without the laboratory.

S703–S706 *Introduction to Theoretical Physics.* This two-semester course in theoretical physics is designed to help bridge the gap between the more general and elementary undergraduate courses and the advanced, more highly analytical courses encountered in graduate school. Mathematical notions such as the gradient, curl, divergence, and dyadics are applied to physical situations. In this approach some of the topics also included are Poissons' and Laplace's equations, the Hamiltonian function, irrotational and solenoidal flow.

These tools are applied in the study of motion, force fields, vibrations, the propagation of mechanical waves, and heat flow. Thermodynamics is developed from the first two laws through the Maxwell relations and the Gibbs phase rule. Electromagnetic theory starts with the problem of expressing Maxwell's equations in the standard vector differential

equation form. Electrostatic problems are considered, using Laplace's and Poisson's equations. Magnetism, the vector potential, the wave equation, retarded potentials, and the Poynting vector follow. *Three semester hours each term.*

S704 *Principles of Underwater Acoustics.* This course is a study of the basic principles of acoustics and the application of these principles to underwater sound problems. Topics considered include oscillations, plane and spherical waves, radiation patterns, reflection coefficient, attenuation, velocity, ray theory, wave theory, scattering, reverberation, fluctuations, echo ranging, and noise. *Three semester hours.*

S709 *Electromagnetic Waves.* The course proceeds from a study of electric and magnetic fields, in which vector analysis is employed, to a consideration of Maxwell's equations and the radiation of electromagnetic waves. Boundary conditions and the propagation phenomena of reflection, refraction, interference, and diffraction are treated in some detail, and wave guides, transmission lines, and radiating systems are introduced. *Three semester hours.*

S710 *Electromagnetic Waves.* Same as S709, Second Term. *Three semester hours.*

S713 *Advanced Inorganic Chemistry.* A study of theoretical and descriptive inorganic chemistry. Theoretical topics include quantum theory, wave mechanics, atomic periodicity, and chemical bonding. Bonding is treated in terms of simple electrostatic theory, valence bond theory, molecular orbital theory, and crystal field theory. Descriptive material includes a detailed study of the rare earths, complex ions, coordination compounds, and reactions in aqueous and nonaqueous media. Certain other special topics are also considered. *Three semester hours.*

S714 *Analytical Chemistry.* Approximately one-half of the course is devoted to classical volumetric and gravimetric methods for the separation and determination of typical inorganic constituents. The second half introduces the student to the use of modern optical and electrical instruments in quantitative analysis. Theory and laboratory procedures and techniques are stressed. Two recitations and two 3-hour laboratory periods. *Four semester hours.*

S715 *Laboratory Physics.* The course in laboratory physics is on the junior-senior level. Consideration is given to the statistical treatment of data and the proper presentation of results. The experiments performed are drawn from many branches of physics and include work in spectroscopy, acoustics, mechanics, and electrical measurements. *One semester hour.*

S716 *Laboratory Physics.* This course is the same as, or a continuation of S715. *One semester hour.*

S717 *Modern Physics.* The course in modern physics is designed for nonphysics majors and covers in one semester the field of atomic and nuclear processes. Topics considered are relativity, quantum processes, atomic structure, basic nuclear phenomena, and nuclear models. *Three semester hours.*

S718 *Modern Physics.* This course is the same as S717, offered during the second term. *Three semester hours.*

S719 *Laboratory Physics.* This course is at the same level as S715, but there are two 2-hour periods each week. *Two semester hours.*

S720 *Laboratory Physics.* The same as S717, offered during the second term. *Two semester hours.*

S801 *Electric Circuit Analysis.* A study of linear system response to sinusoidal, exponential, and damped sinusoidal excitations; network theorems; determinants and matrix algebra as applied to circuit theory; network topology and network equilibrium equations. *Three semester hours.*

S802 *Transient Analysis of Linear Systems.* A study of electrical transients in linear networks using the Laplace transform; the Fourier transform as related to system analysis. *Three semester hours.*

S803 *Atomic Physics.* Three recitations each week are devoted to a study of the basic experimental facts pertaining to the atomic phenomena and an introduction to the theories developed to give a coherent interpretation of those phenomena. Classical concepts are used as a basis and the theory of relativity and quantum mechanics are introduced as needed in the study of kinetic theory, electronics, blackbody radiation, atomic structure, spectra, and X-rays. The laboratory work consists of a study of the theory and propagation of errors and analysis of data, and the performance of such experiments as the Franck-Hertz experiment, the determination of Planck's constant from the photoelectric effect, and the Millikan oildrop experiment. There are three recitations and one 2-hour laboratory period each week. *Four semester hours.*

S804 *Nuclear Physics.* This course is a study of the basic experimental facts pertaining to those phenomena which are purely nuclear in origin and their interpretation in terms of contemporary quantum theory to obtain a coherent understanding of the nuclear force problem. Included subjects are basic nuclear properties, interaction of

radiation with matter, nuclear instruments, nuclear reactions, nuclear structure, elementary structure, and elementary particles. Some typical laboratory experiments are on the subjects of nuclear magnetic resonnance, statistics of random events, scintillation counting and pulse-height analysis, and nuclear emulsions. There are three recitations and one 2-hour laboratory period each week. *Four semester hours.*

SM902 *Science Research Project.* A creative, scientific research project in the field of the student's interest, approved by the science research adviser in the cognizant department. The project may be undertaken only by those in the third year of participation in the Advanced Science and Mathematics Seminar. *Three semester hours.*

S811 & 812 *Physical Chemistry.* An introduction to such topics as: Physical states of matter, kinetic theory of gases and liquids, the laws of thermodynamics, free energy and spontaneity of chemical reactions, phase equilibrium, properties of solutions, chemical kinetics, electrochemistry, elementary quantum theory, and atomic and molecular structure. Three recitations and one 3-hour laboratory. *Four semester hours each term.*

WEAPONS DEPARTMENT

Midshipmen commence the basic Weapons Department curriculum at the beginning of Second Class year. Prior to this time weapons instruction is limited to small arms marksmanship during plebe summer and shipboard familiarization during summer cruise before the beginning of Third Class year.

The basic curriculum, Second Class year, begins with the study of terminal ballistics, conventional and nuclear explosives, reaction propulsion, and target intercept analysis. Laboratory work in support of these courses is in ballistic dispersion analysis, conventional explosives, and static tests of rocket propulsion.

During First Class year the course consists of the study of automatic control systems used in modern weapons systems. Laboratory work in support of automatic control systems consists of the mathematical analysis of the components which make up weapons systems.

Midshipmen receive instruction in both analog and digital computation as part of the basic course in Weapons Laboratory. The Computing Center is equipped with an IBM 1620 digital computer with punched card or typewriter input and output. Special training devices are available to explore the area of logic circuitry, Boolean algebra, and binary systems. Nine analog computers are on hand to set up mathematical models in target intercept analysis and servomechanisms. The laboratory problems are designed to induce the midshipmen to

utilize computers as an aid in the solution of general engineering equations. Analog and digital computer elective courses which go deeper into the area of computer comprehension are also taught.

In view of the complexity of modern weapons systems and other technological areas, a knowledge of computers is now a necessity for the naval officer. An early awareness of the need and subsequent development of computer-oriented courses has placed the Naval Academy in a leading position in the use of computers in undergraduate education.

FOURTH CLASS YEAR

Summer

W100 *Small Arms.* Practical instruction in nomenclature, field stripping, and assembly of small arms. Firing of service rifle, and pistol. Those who qualify are awarded the U.S. Navy Expert Rifleman medal and the U.S. Navy Expert Pistol Shot medal.

THIRD CLASS YEAR

Summer Cruise

Familiarization with gun and missile batteries, anti-submarine ordnance and control systems. Instruction in ammunition handling and safety precautions. Midshipmen man batteries and control stations for target firing exercises.

SECOND CLASS YEAR

Summer

W300 *Digital Computers.* A study of number theory and computer fundamentals. Laboratory instruction in computer programing and computer operation. *One-half semester hour.*

First Semester

W305 *Terminal Ballistics.* Principles of terminal ballistics including target characteristics, damage criteria, theory of chemical and nuclear explosives, explosives effects, and weapons systems effectiveness. Laboratory instruction in explosives testing. *Two and one-quarter semester hours.*

Second Semester

W306 *Target Intercept Analysis.* Weapons control analytics, prediction, flight path analysis and trajectories, and instrumentation for solution of the fire-control problem. Laboratory instruction in analog computers directed toward the solution of the fire control problem. *Two and one-quarter semester hours.*

The IBM 1620 Digital Computer

FIRST CLASS YEAR

Summer Cruise

During the summer cruise, midshipmen of the First Class use their knowledge of weapon systems to control and fire gun and guided missile batteries. They receive practical instruction in weapons control systems, target threat evaluation equipment, safety precautions, and the duties of a gunnery watch and division officer.

First Semester

W407 *Elements of Weapons Systems Dynamics.* Weapons systems tasks, phases, requirements and functional components with emphasis on control systems. The general principles of servomechanisms with viscous and error rate damping. The dynamics of open and closed loop systems emphasizing stabilization networks. *Two and one-half semester hours.*

Second Semester

W408 *Weapons Systems Analysis and Synthesis.* Organization and management of design and systems development. Exterior design, including problem analysis, mathematical models, simulation and measures of effectiveness. Interior design, including system components and tools of system design. Laboratory applications of systems analysis, reliability and a preliminary design study. *Two and one-half semester hours.*

ELECTIVE COURSES

W707 *Digital Computers Programing and Utilization.* An introduction to the principles of digital computer application to data processing, including programing techniques and fundamental components of

special purpose and general purpose computers. Machine language and Fortran programing techniques are employed in connection with the IBM 1620 Data Processing System, and Algol and Cobol programing methods are related to general digital computation. *Three semester hours.*

W708 *Analog Computer—Fundamentals, Programing, and Operation.* A study of the fundamental principles of analog computers, including theoretical and practical aspects of computer components. Mathematical and physical bases of computer components are related to modern electronic analog computation. Practical experience in computer programing is gained through the solution of a variety of problems related to scientific and engineering fields, including introduction to simulation of systems. *Three semester hours.*

W709 *Methods of Weapons Systems Analysis.* Solution of electrical, mechanical, hydraulic, and pneumatic systems using analog analysis. Investigation of periodic and distributed systems; linearization analysis of electronic, missile control, pneumatic, and electromechanical systems. *Three semester hours.*

W802 *Advanced Weapons Systems Engineering.* Taken concurrently with the basic curriculum course, W408 *Weapons Systems Analysis and Synthesis.* It provides a more detailed and thorough study of weapons systems and includes as a term project the complete analysis and synthesis of an operating naval weapons system. *Three semester hours.*

W902 *Weapons Research Project.* A creative technical research project in an aspect of the weapons field in which the student has a special interest, and which is approved by the Weapons Research Adviser in the Department. *Three semester hours.*

Fire Control Director

Administration of the Naval Academy

The administration of the Naval Academy is in many respects analogous to that of any college. A Board of Visitors performs the broad supervisory functions of a board of trustees. The Superintendent, like a college president, is the executive head of the Academy. He is assisted by an administrative staff, the Commandant of Midshipmen, whose function is somewhat like that of a dean of students, and an academic staff. The faculty is organized into eight academic departments, an Executive Department, and a Physical Education Department.

THE BOARD OF VISITORS

A Board of Visitors to the Naval Academy is constituted annually of the chairman of the Committee on Armed Services of the U.S. Senate, or his designee; three other members of the Senate designated by the Vice President of the United States or the President *pro tempore* of the Senate, two of whom are members of the Committee on Appropriations of the Senate; the chairman of the Committee on Armed Services of the U.S. House of Representatives, or his designee; four other members of the House of Representatives designated by the Speaker of the House of Representatives, two of whom are members of the Committee on Appropriations of the House of Representatives; and six persons designated by the President of the United States.

The Board meets annually at the Naval Academy to inquire into the state of morale and discipline, the curriculum, instruction, physical equipment, fiscal affairs, academic methods, and related matters and submits a written report of its action and its views and recommendations pertaining to the Naval Academy to the President of the United States.

The members of the 1963 Board of Visitors were:

Appointed by the President

Mr. William H. Vanderbilt, *Chairman*
Former Governor of Rhode Island and Naval Reserve Commander,
Chestnut Hill, Mass.

Mr. Thomas J. Deegan, Jr., Chairman,
Thomas J. Deegan Company, Inc.,
New York City

Mr. David J. McDonald, President,
United Steel Workers of America,
Pittsburgh, Pa.

Dr. Edgar F. Shannon, Jr., President,
University of Virginia,
Charlottesville, Va.

Mr. Stanley M. Stalford,
Banker and Naval Reserve Commander,
Beverly Hills, Calif.

Mr. Guy Stillman,
Consulting Engineer,
Phoenix, Ariz.

Appointed by the Vice President

Senator E. L. Bartlett, Alaska
Senator J. Glenn Beall, Maryland
Senator A. Willis Robertson, Virginia

Appointed by the Speaker of the House

Hon. Daniel J. Flood, Eleventh District of Pennsylvania
Hon. Elizabeth Kee, Fifth District of West Virginia
Hon. William E. Minshall, Twenty-Third District of Ohio
Hon. K. W. Stinson, Seventh District of Washington

Ex Officio Members

Senator Clifford P. Case, New Jersey
(Designee of Senator Richard B. Russell, Chairman, Committee on Armed Services, U.S. Senate)
Hon. Otis G. Pike,
First District of New York,
(Designee of Hon. Carl Vinson, Chairman, House Armed Services Committee)

The Superintendent Discussing Brigade Affairs with the Midshipman Brigade Commander.

THE SUPERINTENDENT

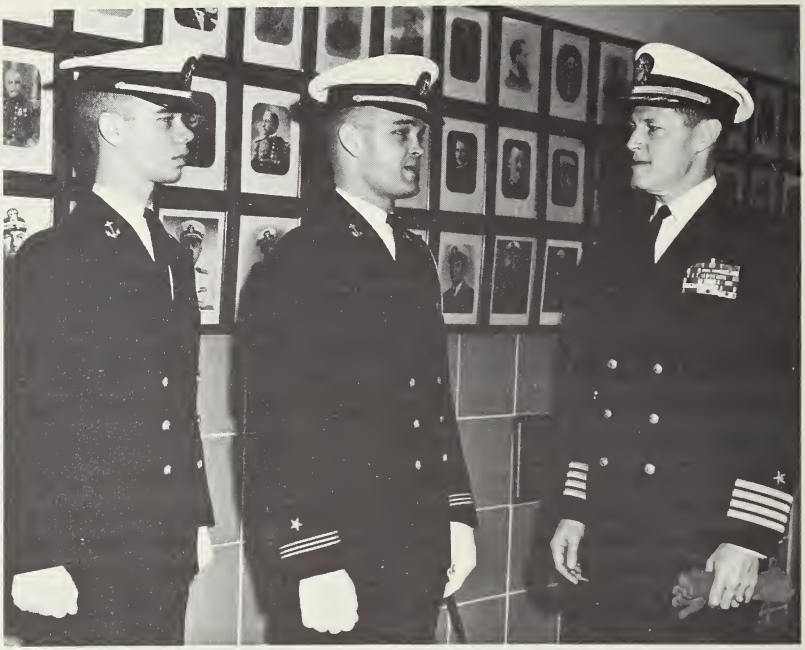
Superintendent—Rear Admiral Charles S. Minter, Jr., USN
Administrative Aide—Captain Roy B. Cowdrey, USN
Executive Assistant and Aide—Lieutenant Commander Samuel O. Jones, Jr., USN
Flag Secretary and Aide—Lieutenant Commander Harold W. Bademan, USN
Special Assistant and Aide—Commander Roland T. E. Bowler, Jr., USN

THE ADMINISTRATIVE STAFF

Personnel and Administrative Officer—Commander Emil Saroch, Jr., USN
Comptroller—Commander Harold R. Tall, USN
Director, Naval Academy Museum—Captain Dale Mayberry, USN (retired)
Legal Officer and Legal Assistance Officer—Captain Paul F. Borden, USN
Public Information and Photographic Officer—Commander Kenneth W. Moorhead, USN
Public Works Officer—Commander Albert R. Marshall, (C.E.C.) USN
Senior Chaplain—Captain James E. Reaves, (Ch. C.) USN
Supply Officer—Captain Randolph Meade, Jr., (S.C.) USN

THE COMMANDANT OF MIDSHIPMEN AND STAFF

Commandant of Midshipmen—Captain Sheldon H. Kinney, USN
Executive Officer—Captain Kenneth B. Brown, USN
Head, Administrative Division—Commander Clifford E. Hunter, USN
Head, Operations Division—Commander Vincent L. Cassani, Jr., USN
First Battalion Officer—Commander Wirt C. Thayer, USN
Second Battalion Officer—Lieutenant Colonel Francis C. Hogan, USMC
Third Battalion Officer—Commander Richard C. Maurer, Jr., USN
Fourth Battalion Officer—Commander William C. Amick, USN
Fifth Battalion Officer—Commander Ernest W. Holloway, USN
Sixth Battalion Officer—Commander Walter J. Donovan, USN
Midshipmen's Pay Officer and Financial Adviser—Commander George L. Fitchett, (S.C.) USN
Officer-in-Charge, Midshipmen's Store—Commander Clarence H. Walton, (S.C.) USN
Midshipmen's Commissary Officer—Commander "J" P. Tice, (S.C.) USN



The Commandant of Midshipmen with Midshipmen of the Watch

THE ACADEMIC STAFF

Academic Dean—Supervisory Professor Bernard Drought; B.E., Milwaukee State Teachers College; M.A., Northwestern University; M.S., S.D. (electrical engineering), Harvard University; P.E.

Secretary of the Academic Board—Captain Robert W. McNitt, USN; B.S., U.S. Naval Academy; M.S., Massachusetts Institute of Technology; Industrial College of the Armed Forces.

Assistant Secretary, Academic Board—Lieutenant Commander James M. Gammon, USN; B.S., U.S. Naval Academy; Naval War College; M.A., George Washington University.

Director of Naval Science—Captain Harry A. Seymour, USN; B.S., U.S. Naval Academy; M.S. (E.E.), University of Pennsylvania; U.S. Naval Postgraduate School; George Washington University; Industrial College of the Armed Forces.

Director of Science and Engineering—Captain James V. Rowney, USN; B.S., U.S. Naval Academy; M.S., Massachusetts Institute of Technology.

Director of Social Sciences and Humanities—Captain Lloyd V. Young, USN; B.S., U.S. Naval Academy; Armed Forces Staff College; National War College; M.A., George Washington University.

Dean of Admissions—Senior Professor William S. Shields; A.B., M.A.,

Ph. D., Western Reserve University; University of Paris; Navy Japanese Language School.

Registrar—Professor Edward T. Hase; B.A., St. Johns College; M.A., Johns Hopkins University.

Librarian—Professor Vernon D. Tate; A.B., University of California (Los Angeles); M.A., Ph. D., University of California (Berkeley).

The Dean and the Secretary of the Academic Board in Conference

DEPARTMENTAL STAFF AND FACULTY, 1963–1964

COMMAND DEPARTMENT

Head of Department: William R. McDowell, Captain, USN; B.A., Occidental College; M.A., Stanford University; Industrial College of the Armed Forces.

Executive Officer: Warren Taylor, Commander, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School; U.S. Naval War College.

Departmental Staff:

Searle J. Barry, Commander, USN; B.S., U.S. Naval Academy.

William Beck, Jr., Lieutenant Commander, USN; B.A., Harvard University; U.S. Naval War College.

Lawrence J. Bowles, Jr., Lieutenant (jg.), USNR; B.S., U.S. Merchant Marine Academy.

Robert T. Buono, Lieutenant, USNR; B.S., Montclair State College.

Joseph L. Byrnes, Lieutenant (jg.), USNR; B.A., University of Kansas City.

Thomas P. Cann, Lieutenant, USN; B.S., U.S. Naval Academy; U.S. Naval Postgraduate School.

David R. Carlisle, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

George B. Chafee, Lieutenant, USN; B.S., U.S. Naval Academy.

Ronald L. Chrans, Lieutenant, USN; B.A., Doane College.

Ralph W. Christy, Lieutenant (jg.), USN; B.S., U.S. Naval Academy.

Robert A. Clark, Lieutenant Commander, USN; B.S., Syracuse University.

Charles W. Cole, Lieutenant Commander, USN; B.S., U.S. Naval Postgraduate School; B.S., Oregon State College; U.S. Naval War College.

Arthur F. Cornell, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

William T. Crawford, Lieutenant Commander, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

John W. DesJardin, Lieutenant Commander, USN; B.S., College of the Holy Cross; M.A., George Washington University.

Frederick P. Eylar, Lieutenant, USN; B.S., U.S. Naval Academy.

William F. Fahey, Lieutenant, USN; B.S., U.S. Merchant Marine Academy.

James E. Farley, Commander, USN; B.S., U.S. Naval Academy.

David B. Ferraro, Lieutenant (jg.), USN; B.S., Pennsylvania State University.

Francis E. Field, Commander, USN; B.S., U.S. Naval Academy; U.S. Naval War College.

Arthur C. Friedman, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Richard Fuller, Jr., Commander, USN; B.S., Ohio State University; M.S., U.S. Naval Postgraduate School.

Jack E. Geary, Lieutenant Commander, USN; B.A., University of California; M.S., U.S. Naval Postgraduate School.

John P. Gower, Lieutenant, USNR; B.S., University of Scranton.

Lynn E. Gessner, Lieutenant, USN.

Donald A. Hartley, Lieutenant, USN; B.A., Southern Illinois University.

John R. Hooper, Lieutenant, USN; B.S., Villanova University.

Herbert A. Hope, Jr., Lieutenant Commander, USN; B.S., U.S. Naval Academy; U.S. Naval Postgraduate School; M.A., George Washington University.

Felix J. Jablonski, Commander, USN; B.A., Texas A. and I.; M.S., U.S. Naval Postgraduate School.

Charles R. Lampman, Lieutenant, USNR; B.S., California Maritime Academy.

John D. Lund, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Richard W. MacKay, Lieutenant, USN; B.A., Pennsylvania State University.

Richard J. Madara, Lieutenant, USN; B.A., Villanova University.

William R. Maloney, Major, USMC; B.A., Brown University; M.A., Stanford University.

Gregory J. Mann, Professor; B.S., M.A., Loyola University (Chicago); Ed. D., University of Maryland.

Alan F. Martin, Lieutenant Commander, USN; B.S., Northwestern University.

Donald J. McKissock, Lieutenant, USN; B.S., Rutgers University.

Nicholas Miklialevsky, Commander, USN; B.S., Columbia University; M.S., U.S. Naval Postgraduate School

Clyde L. Mitchell, Lieutenant, USN; B.S., U.S. Naval Postgraduate School.

Charles G. Nolan, Lieutenant, USN; B.S., U.S. Naval Academy.

Thane N. Olson, Lieutenant Commander, USN; B.A., University of Southern California.

John J. O'Rourke, Lieutenant Commander, USN; B.A., Lake Forest College.

Howard L. Pabst, Lieutenant, USN; B.S., U.S. Naval Academy.

Thomas L. Pasternack, Lieutenant, USNR; B.A., Rutgers University.

Dale S. Perry, Commander, USN; B.E., University of Southern California; U.S. Naval Intelligence School; U.S. Naval Postgraduate School.

William J. Pototsky, Lieutenant Commander, USN; B.S., U.S. Naval Academy; Army Language School; U.S. Naval Intelligence School.

Marvin M. Quaid, Lieutenant Commander, USN; B.A., University of Mississippi; M.S., U.S. Naval Postgraduate School.

Ned C. Roberts, Lieutenant, USN; B.S., U.S. Naval Academy; U.S. Naval Postgraduate School.

William P. Roberts, Lieutenant, USNR; B.S., U.S. Naval Academy; M.A., George Washington University.

John S. Rockett, Lieutenant Commander, USNR; B.S., University of New Mexico; B.S., U.S. Naval Postgraduate School.

Anthony C. Scalese, Jr., Lieutenant Commander, USN; B.S., U.S. Naval Academy; M.A., George Washington University.

Parley G. Schenk, Lieutenant, USN; B.S., University of Utah.

William C. Simanikas, Major, USMC; B.A., University of Michigan.

William D. Sloan, Lieutenant, USN; B.S., U.S. Naval Academy.

Lloyd H. Snider, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Jack E. Speiser, Lieutenant Commander, USN; B.S., Colorado; M.S., U.S. Naval Postgraduate School.

Henry L. Stanfield, Commander, USN; B.M., Duke University; M.S., U.S. Naval Postgraduate School.

Marshall A. Stowell, Lieutenant, USN; B.S., U.S. Naval Postgraduate School.

Robert W. Taylor, Lieutenant Colonel, USMC; B.A., University of Texas.

Marvin W. Zumwalt, Lieutenant Commander, USN; B.N.S., Notre Dame University.

ENGINEERING DEPARTMENT

Head of Department: Wayne Hoof, Captain, USN; B.S., U.S. Naval Academy; M.S., Massachusetts Institute of Technology.

Executive Officer: Donald E. Guhse, Commander, USN; M.S., U.S. Naval Postgraduate School.

Senior Professor: Arthur E. Bock, Professor; B.S., Kansas State College; M.S., Virginia Polytechnic Institute; P.E.

Departmental Staff:

Abdul Mehsin Alwan, Associate Professor; B.S.C.E. (England); M.S., Ph. D. University of Wisconsin.

Edward P. Appert, Commander, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

Eugene M. Avallone, Lieutenant Commander, USN; B.S., U.S. Naval Academy; M.S., Massachusetts Institute of Technology.

William A. Barr, Associate Professor; B.A., St. John's College; B.S., University of Virginia; M.S., Virginia Polytechnic Institute; P.E.

James W. Beeler, Lieutenant Commander, USN; B.S., Iowa State; B.S., U.S. Naval Academy; M.S., U.S. Naval War College.

Leon M. Billow, Assistant Professor; B.S., State Teachers College, Millersville, Pa.; M. Ed., University of Maryland.

Ronald A. Boyle, Lieutenant, USN; B.S., Marquette University.

John J. Branson, Jr., Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School; M.S., U.S. Naval Postgraduate School.

Charles O. Brown, Lieutenant Commander, USN; B.S., Texas Technological College; B.S., M.S., U.S. Naval Postgraduate School.

Thomas D. Clark, Jr., Assistant Professor; B.S., University of Southwestern Louisiana; M.S., Louisiana State University; P.E.

Warren R. Colegrove, Commander, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

Richard I. Comstock, Lieutenant, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

James L. Corder, Lieutenant, USN, B.S., George Washington University.

Kenneth H. Cornett, Lieutenant (j.g.), USN; B.S., Tennessee Polytechnic Institute.

Robert R. Cornwell, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School; M.S., Princeton University.

John M. Davidson, Lieutenant, USN; B.S., University of Colorado.

Herbert C. DeMart, Associate Professor; B.S., University of Pittsburgh; M.S., University of Pittsburgh.

Richard T. Driftmyer, Assistant Professor; B.S., University of Toledo; M.S., Purdue University.

Victor D. Dryden, Lieutenant (j.g.), USN; B.S. Ft. Hays Kansas State College.

Richard P. Dunbar, Lieutenant, USN; B.S., U.S. Naval Academy.

George T. Dyer, Jr., Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Wayne F. Eckley, Associate Professor; B.S., Illinois Wesleyan University; M.S., University of Illinois.

Doc G. Faulkner, Jr., Commander, USN; B.S., Duke University; B.S., U.S. Naval Postgraduate School; M.S., Princeton University.

Paul S. Finden, Lieutenant (j.g.), USN; B. Aero. E., University of Minnesota.

Ronald Frahm, Assistant Professor; M.E., M.S., Stevens Institute of Technology.

Carroll R. Franklin, Captain, USMC; B.S., U.S. Naval Academy.

William H. Geatches, Associate Professor; B.S., U.S. Military Academy; M.S.E., University of Michigan; P.E.

John O. Geremia, Lieutenant, USNR; B.A., B.S., Columbia University; M.S.E., George Washington University.

Thomas C. Gillmer, Associate Professor; B.S., U.S. Naval Academy.

Robert A. Granger, II, Associate Professor; B.A., Pomona College; M.S., Drexel Institute of Technology.

Theodore O. Gregory, Major, USA; B.S., U.S. Military Academy; M.S., University of Southern California.

Hoke D. Griffin, Lieutenant, USN; B.S., U.S. Naval Academy.

Charles O. Heller, Assistant Professor; B.S., M.S., Oklahoma State University.

Edwin G. Hieber, Assistant Professor; M.E., M.S., Stevens Institute of Technology.

William B. Huckenpoehler, Assistant Professor; B.S., U.S. Naval Academy; M.N.E., Catholic University.

Harry L. Hussmann, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School; M.S., Iowa State University.

Perry Y. Jackson, Jr., Lieutenant, USN; B.S., U.S. Naval Academy.

Robert M. Johnston, Professor; B.S., Pennsylvania State College; M.S., Virginia Polytechnic Institute.

Robert W. G. Jones, Captain, USMC; B.S., U.S. Naval Academy.

Robert D. Kemper, Lieutenant, USN; B.S., U.S. Naval Academy.

Carleton J. King, Jr., Lieutenant, USN.; B.S., U.S. Naval Academy.

Tadeusz Kowalski, Assistant Professor; B.S., Glasgow University; M.S., Stevens Institute of Technology.

Stanley W. Krohn, Lieutenant Commander, USN; B.S., U.S. Naval Academy; M.S., Massachusetts Institute of Technology; MBA, Hofstra College.

Robert F. Latham, Associate Professor; B.S., U.S. Naval Academy; M.A., University of Maryland.

Burton R. Laub, Jr., Lieutenant, USN; B.S., U.S. Naval Academy.

William M. Lee, Assistant Professor; B.S., M.S., University of Pittsburgh; P.E.

Leon H. Leutz, Commander, USN; B.S., University of Michigan; M.S., Massachusetts Institute of Technology.

Richard J. Levendoski, Lieutenant, USN; B.S., U.S. Naval Academy, B.S., U.S. Naval Postgraduate School.

Whitney P. Lewis, Lieutenant, USNR; B.S., U.S. Merchant Marine Academy.

Vincent J. Lopardo, Associate Professor; B.S., M.S., University of Pittsburgh; P.E.

John E. Losure, Associate Professor; B.S., U.S. Naval Academy; M.S., Purdue University.

Bernard J. Luterancik, Assistant Professor; B.S., M.S., University of Pittsburgh.

Roger B. McPherson, Lieutenant, USN; B.S., U.S. Naval Academy.

Robert J. McVicker, Commander, USN; B.S., Pennsylvania State University; B.S., U.S. Naval Postgraduate School; M.S., Carnegie Institute of Technology.

Howard E. Miniter, Jr., Lieutenant, USN; B.S., U.S. Naval Academy.

Robert Muksian, Assistant Professor; B.S., M.S., University of Rhode Island.

Keith Nelson, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

Richard H. Oates, Captain, USMC; B.S., U.S. Naval Academy.

Henry H. Page, Jr., Lieutenant, USN; B.S., U.S. Naval Academy.

James F. Peterson, Lieutenant, USN; B.S. University of Missouri; M.S., George Washington University.

David T. Pratt, Assistant Professor; B.S., University of Washington; M.S., University of California.

Lee M. Ramsey, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Bruce H. Rankin, Assistant Professor; B.S,, U.S. Naval Academy; M.S., University of Connecticut.

Ralph R. Reynolds, Lieutenant (j.g.), USN; B.C.E., Villanova University.

Homer K. Richards, Jr., Lieutenant Commander, USN; BA, University of Redlands; B.S., U.S. Naval Postgraduate School; Ae E., California Institute of Technology.

Donald G. Robinson, Jr., Lieutenant Commander, USN; B.S., U.S. Naval Academy.

William H. Schulden, Assistant Professor; B.S., U.S. Naval Academy; M.N.E., Catholic University.

Richard D. Schwartz, Commander, USN; B.S., Duke University.

Charles E. Sieber, Captain, USAF; B.S., U.S. Naval Academy; M.M.E., Oklahoma University.

Francis L. Smith, Jr., Associate Professor; B.S., M.S., University of Pittsburgh; P.E.

Homer L. Smith, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School; Ae E., California Institute of Technology; M.A., George Washington University.

Jack H. Smith, Associate Professor; B.M.E., M.S., University of Florida.

Jay R. Smith, Jr., Lieutenant, USN; B.S., U.S. Naval Academy.

Robert H. Sullivan, Lieutenant Commander, USN; B.S.; M., Massachusetts Maritime Academy.

Norman R. Thom, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School; M.S., University of Michigan.

Robert J. Trott, Commander, USN; B.S., U.S. Naval Academy.

Guy D. Veasey, Lieutenant, USN; B.S., U.S. Naval Academy.

Jack A. White, Lieutenant, USN; B.S., U.S. Naval Academy.

Peter F. Wiggins, Assistant Professor; B. Mar. E., State University of New York Maritime College; M.M.E., New York University.

James R. Wilkins, Jr., Lieutenant Commander, USN; B.S., U.S. Naval Academy; M.S., Webb Institute of Naval Architecture.

Edward A. Wilkinson, Jr., Lieutenant, USN; B.S., U.S. Naval Academy; M.S.E., George Washington University.

Robert T. Wurzbacher, Lieutenant Commander, USN; B.S. Pennsylvania State University.

Thomas M. York, Assistant Professor; B.S., M.S., Pennsylvania State University.

Stewart T. Zink, Lieutenant Commander, USN; B.S., U.S. Naval Postgraduate School; M.S.E., Princeton University.

ENGLISH, HISTORY AND GOVERNMENT DEPARTMENT

Head of Department: Charles J. Merdinger, Captain, (C.E.C.) USN; B.S., U.S. Naval Academy; B.C.E., M.C.E., Rensselaer Polytechnic Institute; D. Phil., Oxford University (Brasenose); P.E.

Executive Officer: William C. Chapman, Commander, USN; B.S., U.S. Naval Academy; U.S. Armed Forces Staff College, M.A., The George Washington University.

Senior Professor: William W. Jeffries; A.B., Birmingham-Southern College; M.A., Ph. D., Vanderbilt University.

Departmental Staff:

Henry H. Adams, Associate Professor; B.A., University of Michigan; M.A., Ph. D., Columbia University.

Norman A. Anderson, Associate Professor; B.A., Principia College; M.A., University of California (Berkeley); Ph. D., University of Wisconsin.

James A. Arnold, Associate Professor; B.A., M.A., Ph. D., Princeton University.

Haney H. Bell, Jr., Associate Professor; B.A., Randolph-Macon College.

William M. Belote, Associate Professor; B.A., M.A., University of Washington; Ph. D., University of California (Berkeley).

Robert A. Bender, Associate Professor; B.A., M.A., Princeton University.

John P. Boatman, Associate Professor; B.A., Brothers College of Drew University; M.A., Peabody College.

Thomas Boyajy, Associate Professor; B.A., American International College; M.A., Hartford Seminary Foundation.

William L. Calderhead, Assistant Professor; B.A., M.A., Ph. D., University of Pennsylvania.

Nicholas A. Canzona, Instructor; B.S., The Johns Hopkins University.

Thomas P. Carpenter, Associate Professor; B.A., Clark University; M.A., Ph. D., Stanford University.

Ellery H. Clark, Jr., Associate Professor; B.A., Harvard College; M.A., Boston University.

Walter D. E. Coenen, Lieutenant, (S.C.) USN; B.A., University of North Carolina.

Paolo E. Coletta, Professor; B.S., M.A., Ph. D., University of Missouri.

James L. Collier, Lieutenant, USNR; B.A., LaSalle College; M.A., Temple University.

Allen B. Cook, Professor; B.S., U.S. Naval Academy; M.A., University of Virginia.

Jack C. Crandall, Commander, USN; B.S., U.S. Merchant Marine Academy; B.S., University of Rhode Island; M.A., Emory University; U.S. Naval War College.

Charles L. Crane, Jr., Associate Professor; B.A., Davidson College; M.A., University of North Carolina.

James R. Cutting, Professor; B.S., M.A., Princeton University.

Robert W. Daly, Professor; Ph. B., M.A., Ph. D., Loyola University (Chicago).

William M. Darden, Associate Professor; B.A., M.A., University of North Carolina.

Paul C. Dunleavy, Associate Professor; B.A., St. John's College; M.A., George Washington University.

Henry C. Durham, Jr.; B.A., San Diego State College; M.A., Ph. D., University of Munich.

Michael M. Eisman, Lieutenant (j.g.), USNR; B.A., M.A., University of Michigan.

Robert W. Farrand, Lieutenant, USNR; B.S., II, Mount Saint Mary's College.

Lawrence J. Flink, Lieutenant, USNR; B.A., Wabash College; M.A., Western Reserve University.

John R. Fredland, Professor; B.A., Bates College; Ph. D., American University.

Edwin M. Hall, Professor; B.A., Williams College; M.A., University of Chicago; Ph. D., Pennsylvania State University.

Robert J. Harlow, Commander, USN; B.A., University of Minnesota.

Wilson L. Heflin, Professor; B.A., Birmingham-Southern College; M.A., Ph. D., Vanderbilt University.

Paul J. Hurley, Assistant Professor; B.A., M.A., University of Pittsburgh; Ph. D., Duke University.

Michael Jasperson, Lieutenant, USN; B.A., University of Virginia; M.A., Georgetown University.

John W. Huston, Associate Professor; B.A., Monmouth College; M.A., Ph. D., University of Pittsburgh.

Ronald H. Jermstad, Lieutenant Commander, USN; B.S., Wisconsin State College; M.A., George Washington University.

Warren F. Kimball, Lieutenant, USNR; B.A., Villanova University.

Neville T. Kirk, Professor; B.A., M.A., Columbia University.

Douglas R. Lacey, Professor; B.A., Illinois College; M.A., Rutgers University; Ph. D., Columbia University.

Robert M. Langdon, Associate Pro-

fessor; B.S., Hamilton College; M.A., University of North Carolina.

Winston B. Lewis, Associate Professor; B.A., Amherst College; M.A., Ph. D., Harvard University.

Elmer J. Mahoney, Professor; B.A., Western Maryland College; LL.B., University of Maryland.

Homer O. Mains, Jr., Lieutenant Commander, USN; B.A., University of Virginia.

Robert L. Mason, Professor; B.S., Middle Tennessee State College; M.A., Ph. D., George Peabody College for Teachers.

Malcom J. McAuley, Lieutenant (j.g.) (SC), USNR; A.A., Yuba College; B.S., University of California (Berkeley); M.B.A., University of California (Los Angeles).

Donald L. McCarthy, Lieutenant (SC), USN; B.S. (B.A.), Boston College; M.B.A., Babson Institute.

Robert R. Meeker, Jr., Major, USMC; B.A., M.A., University of Miami.

Richard Megargee, Associate Professor, B.A., Princeton University; M.A.; Ph. D., Northwestern University.

Frank H. Mullen, First Lieutenant USAR; B.B.A., University of Notre Dame; M.A., University of Pennsylvania.

Rocco M. Paone, Associate Professor; B.A., M.A., Fordham University; Ph. D., Georgetown University.

Harry F. Philson, Captain, USMC; B.A., University of the South; M.A., Emory University.

A. Stuart Pitt, Professor; B.A., M.A., Ph. D., Yale University.

James T. Pole, Associate Professor; B.A., Lafayette College; M.A., Columbia University.

Elmer B. Potter, Professor; B.A., University of Richmond; M.A., University of Chicago.

John R. Probert, Professor; B.A., M.A., Lafayette College; Ph. D., University of Pennsylvania.

John C. Reed, Professor; B.A., Brown University; B. Litt., Oxford University (Merton).

Arthur A. Richmond, Associate Professor; B.A., Williams College; Ph. D., Yale University.

Bruce R. Richmond, Lieutenant, USN; B.A., Cornell University.

Alan M. Rose, Assistant Professor; B.A., Johns Hopkins University; M.A., Columbia University.

Thomas H. K. Russell, Commander, (S.C.), USN; B.S., Johns Hopkins University.

William H. Russell, Associate Professor; B.A., Haverford College; M.A., Harvard University.

Robert Seager, Assistant Professor; B.A., Rutgers University; M.A., Columbia University; Ph. D., Ohio State University.

Francis B. Shemanski, Lieutenant Commander, USN; B.A., Fordham University; M.A., University of California (Berkeley).

Glenn E. Skaggs, Lieutenant, USNR; B.A., University of Illinois.

Paul Skarlatos, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Stephen B. Sloane, Lieutenant, USN; B.S., U.S. Naval Academy; M.P.A., Harvard University.

George W. Sutton, Ensign, USNR; B.A., Georgetown College (Kentucky) M.A., University of Mississippi.

James P. Thomas, Jr., Assistant Professor; B.A., Yale University; M.A., Johns Hopkins University.

Don D. Thornbury, Associate Professor; B.A., M.A., University of Michigan.

Herman O. Werner, Professor; B.A., M.A., Brown University; M.A., Ph. D., Harvard University.

Richard S. West, Jr., Professor; B.A., Vanderbilt University; M.A., Yale University.

George H. Wheelock, Lieutenant (j.g.), USNR; B.S., Purdue University; M.A., University of Illinois.

Rowan A. Williams, Associate Professor; B.A., Princeton University; M.A., Ph. D., University of Pennsylvania.

H. Alan Wycherley, Associate Professor; B.A., M.A., University of Pennsylvania.

John N. Wysong, Associate Professor; B.A., University of Oregon; M.A., University of California; Ph. D., University of Innsbruck (Austria).

EXECUTIVE DEPARTMENT

Head of Department: Sheldon H. Kinney, Captain, USN; B.S., U.S. Naval Academy; National War College; Juris Doctor Degree, George Washington University.

Executive Officer: Kenneth B. Brown, Captain, USN; B.S., U.S. Naval Academy; U.S. Naval War College.

Departmental Staff:

William C. Amick, Jr., Commander, USN; B.S., U.S. Naval Academy; Armed Forces Staff College.

Craig L. Barnum, Lieutenant, USN; B.S., U.S. Naval Academy.

John S. Brennan, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Randolph M. Browne, Captain, USMC; B.S., U.S. Naval Academy.

Vincent L. Cassani, Jr., Commander, USN; B.S., U.S. Naval Academy; U.S. Naval War College.

Max E. Corrick, Lieutenant Commander, USN; Boone Junior College (Iowa).

Walter J. Donovan, Commander, USN; B.S., U.S. Naval Academy.

Steven H. Edwards, Lieutenant, USN; B.S., U.S. Naval Academy.

William A. Finlay, Jr., Lieutenant Commander, USN; B.S., U.S. Naval Academy.

George L. Fitchett, Commander, (S.C.), USN; B.S., U.S. Naval Academy; M.B.A., Harvard University.

Donald C. Gilley, Professor; B. Mus., Oberlin Conservatory of Music; M. Mus., Cincinnati Conservatory of Music; A.A.A.G., C.H.M., American Guild of Organists.

Thomas L. Griffin, Jr., Major, USMC; B.S., U.S. Naval Academy.

Francis C. Hogan, Lieutenant Colonel, USMC; B.A., M.A., Stanford University.

Lawrence M. Hogan, Lieutenant, USN; B.S., U.S. Naval Academy.

Ernest W. Holloway, Commander, USN; B.S., U.S. Naval Academy.

John P. Holm, Lieutenant, USN; B.S., University of Wisconsin.

Clifford E. Hunter, Commander, USN; B.S., U.S. Naval Academy; U.S. Naval War College.

Forney H. Ingram, Lieutenant, USN; B.S., U.S. Naval Academy.

Harold R. Lockwood, Lieutenant Commander, USN; B.S., U.S. Naval Academy; General Line School, U.S. Naval War College.

John R. Love, Major, USMC; B.S., U.S. Naval Academy.

Richard C. Maurer, Commander, USN; B.S., U.S. Naval Academy; Armed Forces Staff College.

Norman A. Mayo, Lieutenant, USN; B.S., U.S. Naval Academy.

Daniel E. McGlasson, Lieutenant, USN; B.S., U.S. Naval Academy.

William H. McInnis, Lieutenant, (S.C.) USN; University of New Mexico.

Roger W. McLain, Captain, USAF; B.A., State University of Iowa.

James S. McNeely, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Charles E. Mumford, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Richard H. Nace, Lieutenant, (S.C.), USN; B.S., U.S. Naval Academy.

Karl L. Peterson, Lieutenant, USN; B.S., U.S. Naval Academy.

John F. Phelan, Lieutenant, USN.

Brooke F. Read, Jr., Major, USMC; B.S., U.S. Naval Academy.

Glen Sanford, Captain, USMC; B.S., U.S. Naval Academy.

James E. Shay, Lieutenant, USN; B.S., U.S. Naval Academy.

Edwin B. Smedberg, Lieutenant, USN; B.S., U.S. Naval Academy.

Ernest H. Smith, Lieutenant, (S.C.) USN.

Joseph L. Steckler, Lieutenant, USN; B.S., U.S. Naval Academy.

James M. Taylor, Lieutenant Commander, (S.C.), USN; B.A., Piedmont College; LLB, Woodrow Wilson College of Law.

Wirt C. Thayer, Commander, USN; B.S., U.S. Naval Academy.

William J. Thearle, Lieutenant, USN; B.S., U.S. Naval Academy.

"J" Philip Tice, Commander, (S.C.) USN; B.S., Miami University; M.B.A., University of Michigan.

Harold F. Tipton, Jr., Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Maurice F. Tyler, Lieutenant, USN; B.S., U.S. Naval Academy.

Truxtun Umsted, Lieutenant, USN; B.S., U.S. Naval Academy.

Clarence H. Walton, Commander, (S.C.) USN; B.B.A., University of Chattanooga; Navy Industrial Relations Institute.

Robert L. Warren, Lieutenant, USN; B.S., U.S. Naval Academy.

Glendon H. Weir, Lieutenant (j.g.), USN.

James H. Wynn III, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Emory P. Zimmer, Lieutenant, USN; B.S., U.S. Naval Academy.

FOREIGN LANGUAGES DEPARTMENT

Head of Department: Charles T. Cooper, Captain, USN; B.S., U.S. Naval Academy; U.S. Naval War College.

Executive Officer: Aldo J. DaRodda, Lieutenant Commander, USN; B.A., Dickinson College.

Senior Professor: John D. Yarbro; A.B., University of Kentucky; M.A., Columbia University.

Departmental Staff:

Paul M. Beadle, Professor; B.A., University of Southwestern Louisiana; M.A., George Peabody College for Teachers.

William H. Berry, Professor; B.A., University of Richmond; M.A., Columbia University.

Tomas Ortega Bertrand, Lieutenant, Mexican Navy; Heroica Escuela Naval Militar (Mexico).

Zaven Boghossian, Lieutenant Commander, Brazilian Navy; B.S., Escola Naval (Brazil).

William H. Buffum, Associate Professor; B.A., M.A., Princeton University.

Lloyd W. Buhrman, Associate Professor; B.A., M.A., Washington University; Ph. D., George Washington University.

Angel Cabrillo-Vazquez, Professor; B.S., Escuela de Artes e Industrias; M.A., Catholic University of America; Ph. D., University of Madrid.

Pierre Clement, Lieutenant Commander, French Navy; l'Ecole Navale (France).

Angelo J. Collura, Lieutenant, USNR; B.A., Pennsylvania State University; M.S., Georgetown University.

Ernest A. DeRosa, Associate Professor; B.A., M.A., Montclair State College; M.A., Middlebury College.

Henry W. Drexel, Professor; B.A., Amherst College; M.A., Columbia University.

James H. Elsdon, Professor; B.A., University of Minnesota; M.A., Ph. D., University of California.

Rodger A. Farley, Associate Professor; B.A., M.A., Washington University; Ph. D., Florida State University.

Lawrence B. Goldstein, Lieutenant, USN; B.S., U.S. Naval Academy.

John E. Griffiths, Associate Professor; B.A., Lafayette College; M.A. (Spanish), M.A. (French), Middlebury College.

Arthur R. Gustavson, Lietutenant Commander, (S.C.) USN; B.S., U.S. Naval Academy.

Medardo Gutierrez, Associate Professor; B.A. (Education), M.A., University of Michigan.

Alden R. Hefler, Professor; B.A., Dartmouth College; M.A., Harvard University; Ph. D., Wisconsin University.

John A. Hutchins, Associate Professor; B.A., Allegheny College; M.A.,

Fletcher School of Law & Diplomacy; Ph. D., American University.

Harry R. Keller, Jr., Associate Professor; B.A., University of Cincinnati; M.A. (Russian), Middlebury College; M.A. (Romance Lang.), Princeton University; LL.B., University of Maryland.

George H. Koenig, Instructor; B.A., M.A., Middlebury College.

Kendall E. Lappin, Associate Professor; B.A., DePauw University; M.A. (French), M.A. (Russian), Middlebury College.

Bernard P. Lebeau, Assistant Professor; B.A., Ohio University; M.A., Ohio State University.

Claude P. Lemieux, Professor; B.A., Louisiana State University; M.A., Middlebury College.

Charles R. Michaud, Associate Professor; B.A., University of Illinois; M.A., Northwestern University.

René F. Muller, Professor; B.A., M.A., Columbia University.

Murray M. J. Nicholson, Jr., Lieutenant, USN; B.S., U.S. Naval Academy.

Samuel J. O'Neill, Assistant Professor; B A., Boston College; M.A., Fordham University.

Gary R. Pelphrey, Lieutenant, USN; B.S., U.S. Naval Academy.

Karl H. Peter, Lieutenant Commander, German Navy; German Naval Academy.

C. Albert Pritchard, Associate Professor; B.A., M.A. (French), M.A. (Spanish), Middlebury College.

Paul A. Revak, Lieutenant, USN; A.B., Stanford University.

Guy J. Riccio, Associate Professor; B.A., Queens College; M.A., University of Wisconsin; Ph. D., University of Maryland.

Kurt P. Roderbourg, Associate Professor; M.A., Harvard University.

Edward J. Satterthwaite, Associate Professor; B.A., M.A., University of California (Berkeley).

Pietro Scagliusi, Lieutenant Commander, Italian Navy; Maturitá Liceo Classico (Italy); Italian Naval Academy; HMS *Mercury*, England; Italian Naval War College.

Wesley W. Sewell, Associate Professor; A.B., Florida Southern College; M.A., Middlebury College.

Robert M. Stanford, Instructor; B.A., Tufts University.

George E. Starnes, Professor; B.A., Roanoke College.

Vladimir S. Tolstoy, Assistant Professor; B.A., Hobart College; M.A., Georgetown University; Licence en Theologie, Institut de Theologie Orthodoxe de Paris.

Robert S. Webber, Lieutenant (j.g.), USNR; B.A., Duke University.

Peter Yadlowsky, Captain, USMC; B.S., U.S. Naval Academy.

MATHEMATICS DEPARTMENT

Head of Department: Edgar A. Robie, Captain, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School; M.S., University of Minnesota; U.S. Naval War College.

Executive Officer: Albert A. Folop, Commander, USN; B.A., University of Oklahoma; A.M., Princeton University.

Senior Professor: Livingston H. Chambers; A.B., A.M., West Virginia University; Ph. D., Cornell University.

Departmental Staff:

James C. Abbott, Professor; B.S., M.A., Harvard University; Ph. D., University of Notre Dame.

Edward H. Alexander, Jr., Lieutenant (j.g.), USNR; B.A., Tufts University.

Robert W. Arn, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

Richard P. Bailey, Professor; B.A., M.A., Ph. D., University of Pennsylvania.

Norman H. Ball, Professor; B.S.,

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Ph. D., Massachusetts Institute of Technology.

Clarence L. Beall, Assistant Professor; B.S., Westminster College; M.A., University of Maryland.

Theodore J. Benac, Professor; B.S., St. Michael's College; M.S., University of Connecticut; Ph. D., Yale University.

Edward P. Berger, Assistant Professor; B.S., M.A., Duke University.

Ebon E. Betz, Professor; A.B., Albion College; M.A., University of Michigan; Ph. D., University of Pennsylvania.

James R. Bland, Professor; B.Sc., Brown University.

William H. Bowling, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School; M.S., Massachusetts Institute of Technology.

Carroll P. Brady, Professor; B.A., M.A., University of California (Los Angeles); Ph. D., University of Chicago.

Burnill H. Buikstra, Associate Professor; B.S., M.S., Kansas State College.

Herbert J. Burrows, Lieutenant Commander, USN; B.A., Brown University; B.S.E.E., U.S. Naval Postgraduate School; M.S., Rensselaer Polytechnic Institute.

Curtis E. Caudill, Captain, USMC; B.A., Cornell University.

John B. Chapman, Lieutenant (jg.), USNR; B.S., Baylor University.

Joseph E. Cicero, Assistant Professor; A.B., Drew University; M.S., University of Notre Dame.

Bruce A. Clark, Lieutenant, USN; B.S., U.S. Naval Academy.

Ronald L. Clark, Ensign, USNR; B.B.A., University of Michigan.

Thomas H. Copeman, Jr., Lieutenant, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

Albert E. Currier, Professor; S.B., A.M., Ph. D., Harvard University.

William H. Dawson, Lieutenant, USN; B.S., U.S. Naval Academy.

Danforth W. Durland, Assistant Professor; B.A., Middlebury College; M.S., Lehigh University.

Milo V. Gibbons, Associate Professor; B.S., Guilford College; M.A., University of Maryland.

George W. Gibson, Commander, USN; B.A., Pennsylvania State University; M.S., U.S. Naval Postgraduate School.

John R. Gorman, Associate Professor; A.A., Los Angeles City College; B.A., M.A., University of California (Los Angeles).

Edwin C. Gras, Associate Professor; B.A., M.A., Harvard University.

Frederick W. Hager, Assistant Professor; B.S., Franklin and Marshall College; M.S., University of Delaware.

Jacques R. Hammond, Professor; B.A., University of Rochester; M.A., Harvard University.

Ernest Hawkins, Professor; B.A., M.A., Wesleyan University.

Justus M. Holme, Professor; B.S., C.E., University of Pennsylvania; M.S., Lehigh University; P.E.

John P. Hoyt, Professor; B.S., Middlebury College; M.A., Columbia University; Ph. D., George Washington University.

Harold M. Kaplan, Assistant Professor; B.S., Massachusetts Institute of Technology; M.A., Princeton University.

Arthur A. Karwath, Associate Professor; B.S., St. Ambrose College; M.S., Iowa State College.

William F. Kelly, Commander, USN; B.S., University of New Mexico; B.S., U.S. Naval Postgraduate School.

Herbert L. Kinsolving, Associate Professor; B.S., Yale University; M.A., Harvard University.

Martin E. Lewis, Lieutenant Commander, USN; B.S., University of Southern California; B.S., U.S. Naval Postgraduate School.

George A. Lyle, Professor; B.S., Hampden Sidney College; M.A., Lehigh University.

William T. Marin, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

Alban T. McIsaac, Lieutenant, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

James D. McPherson, Assistant Professor; B.S., West Chester State College; M.A., Pennsylvania State University.

Robert W. Meissner, Lieutenant Commander, USN; B.S., University of Minnesota; B.S., U.S. Naval Postgraduate School.

Joseph Milkman, Professor; B.S., M.A., Brooklyn College; Ph. D., New York University.

John F. Milos, Associate Professor; B.A., Dartmouth College; M.A., Columbia University.

Richard Molloy, Associate Professor; B.S., Loyola College; M.A., Johns Hopkins University.

Charles H. Morris, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Richard C. Morrow, Professor; B.A., M.A., Washington and Jefferson College.

Donald L. Muench, Assistant Professor; B.S., St. John Fisher College; M.S., St. John's University.

Nathan O. Niles, Associate Professor; B.S., M.S., St. Lawrence University.

Kenneth L. Palmquist, Professor; B.A., Bethany College; M.A., University of Missouri; Ph. D., University of Kentucky.

Joseph F. Paydon, Professor; B.A., North Central College; M.A., Ph. D., Northwestern University.

Harold I. Pollack, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Virgil N. Robinson, Professor; B.A., M.A., Vanderbilt University; Ph. D., University of Chicago.

Oscar E. Sanden, Jr., Lieutenant Commander, USN; B.A., University of Minnesota; M.A., Teachers College, Columbia University; M.S., U.S. Naval Postgraduate School.

Samuel S. Saslaw, Professor; B.S., M.S., Ph. D., Massachusetts Institute of Technology.

Henry E. Schick, Lieutenant, USNR; B.A., University of Minnesota.

Walton H. Sears, Jr., Professor; B.A., M.A., Harvard University; M.A., University of Vermont.

Harold K. Sohl, Professor; B.A., Ph. D., Johns Hopkins University.

Mahlon F. Stilwell, Associate Professor; B.S., Hamilton College; M.A., Syracuse University.

Herman C. Stotz, Professor; B.C.E., Northeastern University; M.A., Boston University.

William J. Strange, Associate Professor; B.A., Park College; M.A., Syracuse University.

George R. Strohl, Jr., Professor; B.A., Haverford College; M.A., University of Pennsylvania; Ph. D., University of Maryland.

Earl G. Swafford, Associate Professor; B.A., Miami University; M.A., Syracuse University.

Orville M. Thomas, Associate Professor; B. Ed., Winona State Teachers College; M.A., Colorado State College of Education.

Clarence E. Thompson, Associate Professor; B.S., Geneva College; M.A., Duke University.

John A. Tierney, Professor; B.E., Teachers College of Connecticut; M.A., Columbia University; Ph. D., University of Maryland.

Donald G. Todaro, Lieutenant, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

Francis E. Walker, Jr., Lieutenant (j.g.), USNR; B.A., Duke University.

Harry E. Wells, Captain, USMC; B.S., U.S. Naval Academy.

John H. White, Associate Professor; B.A., Princeton University; M.A., Columbia University.

Harold Wierenga, Associate Professor; B.S., M.S., Kansas State College.

William G. A. Sympson, Jr., Lieutenant, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

Carvel S. Wolfe, Associate Professor; B.S., M.S., University of Arizona.

Stephen Zamoscianyk, Assistant Professor; B.S., Polytechnic Institute of Brooklyn; M.S., Illinois Institute of Technology.

NAVAL HYGIENE DEPARTMENT

Head of Department: Herbert H. Eighmy, Captain, USN; B.S., Allegheny College; M.D., Hahnemann Medical College; Northwestern University (P.G.); University of Pennsylvania (P.G.); Chemical Warfare School; U.S. Naval School of Aviation Medicine.

Departmental Staff:

William F. Gallagher, Lieutenant, USNR; B.A., Dartmouth College; M.D., Dartmouth Medical School and Harvard Medical School.

Doyle D. Hagg, Lieutenant, USN; B.A., State University of South Dakota; M.D., Jefferson Medical College; U.S. Naval School of Aviation Medicine.

Spencer F. Maddox, Lieutenant Commander, USN; B.A., Mercer University; M.D., Medical College of Georgia.

Howard F. Noble, Commander, USN; B.A., M. Ed., Duquesne University.

Patrick F. O'Connell, Commander, USN; John Carroll University, Colorado University; M.D., St. Louis University School of Medicine; U.S. Naval School of Aviation Medicine.

John F. Shaul, Captain, USN; B.S., Lafayette College; M.D., New York Medical College.

Winthrop F. Smith, Captain, USN; D.M.D., Harvard University Dental School; U.S. Naval Dental School.

William R. Stanmeyer, Captain, USN; B.S., D.D.S., University of Illinois; F.A.C.D.; U.S. Naval Dental School.

Harry E. Von Ertfelda, Jr., Lieutenant, USNR; B.S., Boston College; M.D., Georgetown University.

PHYSICAL EDUCATION DEPARTMENT

Head of Department: William S. Busik, Captain, USN; B.S., U.S. Naval Academy; U.S. Naval War College.

Executive Officer: John S. Donaldson, Commander, USN; B.S., U.S. Naval Academy; U.S. Armed Forces Staff College; U.S. Naval War College.

Departmental Staff:

Stephen N. Belichick, Assistant Professor; B.A., M.A., Western Reserve University.

Willis P. Bilderback, Associate Professor; B. Litt., M. Ed., Rutgers University.

Bernard L. Carnevale, Associate Professor; B.S., New York University.

Jack M. Cloud, Assistant Professor; B.S., William & Mary College.

Thomas B. Darling, Assistant Professor; B.S., University of Pittsburgh; M.A., Michigan State University.

Andre R. Deladrier, Associate Professor; B.S., St. John's University; M.A., Columbia University.

Joseph C. Duff, Associate Professor; B.S., West Virginia University.

Joseph O. Fournier, Lieutenant, USN B.A., University of California (Berkeley).

James M. Gehrdes, Associate Professor; B.S., Pennsylvania State University.

John H. Higgins, Associate Professor; B.S., Ohio State University.

John I. Hopkins, Captain, USMC; B.S., U.S. Naval Academy.

James M. Lang, Lieutenant Commander, USN; B.S., University of California (Los Angeles).

Heinz W. Lenz, Assistant Professor; B.S., Ohio State University; M.S., Columbia University.

Richard J. Link, Lieutenant, USN; B.S., Western Michigan University.

William M. Moore, Lieutenant (j.g.), (SC) USN; B.S., U.S. Naval Academy.

Harvey A. Muller, Associate Professor; B.S., M.A., University of Michigan.

Edwin C. Peery, Assistant Professor; B.S., University of Pittsburgh.

Chester W. Phillips, Associate Professor; B.S., Temple University.

Arthur M. Potter, Associate Professor; B.S., Springfield College; M. Ed., M.S., University of Delaware.

John N. Rammacher, Associate Professor; B.S., Pennsylvania State University.

Alan J. Richards, Associate Professor; B.S., M. Ed., University of Maryland.

Anthony J. Rubino, Professor; B.S., Pennsylvania State University.

Walter F. Saubers, Lieutenant Commander, USN; B.S., Blackhills Teachers College; U.S. Naval Postgraduate School.

David P. Smalley, Instructor; B.S., U.S. Naval Academy.

Emerson P. Smith, Assistant Professor; B.S., Geneva College.

John W. Smith, Lieutenant, USN; B.S., U.S. Naval Academy.

Raymond H. Swartz, Associate Professor; B.S., Oklahoma State University.

Floyd H. Warner, Associate Professor; B.S., M. Ed., Springfield College.

Ronald A. Wild, Lieutenant, USN; B.S., State University of New York; M.S., University of Indiana.

SCIENCE DEPARTMENT

Head of Department: Jack S. Laney, Captain, USN; B.S., U.S. Naval Academy; M.S., University of Minnesota.

Executive Officer: Robert A. Swensen, Commander, USN; B.S., U.S. Naval Academy; M.A., George Washington University.

Senior Professor: Edward J. Cook; B.Ch.E., M.S., University of Minnesota; Dr. Eng., Johns Hopkins University.

Departmental Staff:

Henry H. Baker, Jr., Professor; B.A., Dartmouth College; M.S., Ph. D., New York University; P.E.

William J. Bates, Assistant Professor; B.S., Iona College; M.S., Fordham University.

Charles G. Brady, Jr., Commander, USN; Florida State University; U.S. Naval Postgraduate School.

Donald W. Brill, Assistant Professor; B.S., Washington College; M.S., University of Delaware.

Francis E. Brooks, Lieutenant Commander, USN; B.A., University of Kansas; M.S., Stanford University.

Gary L. Buckwalter, Assistant Professor; B.S., Pennsylvania State University; M.S., Catholic University of America.

Michael D. Cerreta, Jr., Captain, USMC; B.S., University of Pittsburgh.

David J. Chadwick, Ensign, USNR; B.S., University of Kentucky.

Albert E. Conord, Assistant Professor; B.S., U.S. Naval Academy; M.S., Catholic University of America.

James E. Criner, Lieutenant Commander, USN; B.S., U.S. Naval Post Graduate School.

William R. Curtis, Lieutenant, USN; B.A., Oberlin College; M.S., Purdue University; M.S., U.S. Naval Postgraduate School.

John L. Daley, Professor; B.S., M.S.E.E., Ph. D., Yale University.

Duane D. DeWitt, Lieutenant Commander, USN; B.S.E.E., U.S. Naval Post Graduate School.

Marvin L. Duke, Lieutenant Commander,USN; B.S., U.S. Naval Academy; B.S.E.E., U.S. Naval Post Graduate School; M.S., Iowa State University.

Laurence A. Dwyer, Lieutenant Commander, USN; B.S., University of Illinois; M.S., U.S. Naval Post Graduate School.

Francis J. Eberhardt, Assistant Professor; B.S.E.E., University of Wisconsin; M.S., Catholic University of America.

Myron Eckhart, Jr., Commander, USN; B.S., U.S. Naval Academy; B.S.E.E., Massachusetts Institute of Technology.

Denver D. Eddy, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S.E.E., U.S. Naval Postgraduate School.

Charles F. Egan, Jr., Lieutenant (jg.), USNR; B.S., M.S., Holy Cross College.

Gerald L. Ehrens, Lieutenant (j.g.), USN; B.S.E., Princeton University.

John W. Ehrmantraut, Lieutenant (j.g.), USN; B.S., University of Illinois.

William E. Fasnacht, Instructor; B.S., Oregon State College.

John F. Felter, Lieutenant, USN; B.A., Dartmouth College.

George D. Florence, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Charles A. Fowler III, Associate Professor; B.S., U.S. Naval Academy; M.S., University of Wyoming.

Donald H. Gehring, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

John J. Gilheany, Assistant Professor; B.A., Villanova University; M.S., Catholic University of America.

Frank J. Gomba, Associate Professor; B.A., M.A., Montclair State College.

Ralph A. Goodwin, Professor; B.A., Simpson College; M.S., Ph. D., Iowa State College.

Paul Goslow, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., (Aero), M.S.E.E., U.S. Naval Postgraduate School.

Richard M. Gowing, Lieutenant Commander, USN; B.S., U.S. Naval Academy; M.S., Pennsylvania State University.

Billie J. Graham, Assistant Professor; B.S., Hampden-Sydney College; M.S., University of Cincinnati.

Graham D. Gutsche, Professor; B.S., University of Colorado; M.S., University of Minnesota; Ph. D., Catholic University of America.

Gaylord T. Hageseth, Lieutenant, USNR; B.S., University of North Carolina; M.S., Catholic University of America.

Edgar D. Hall, Associate Professor; B.S., Parsons College; M.S., Catholic University of America.

Arthur Hamilt, Lieutenant, USN; B.S., Tufts University.

Martin E. Hardy, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

James W. Harrod, Lieutenant, USN; B.S., Westminister College (Missouri).

Donald L. Hathway, Associate Professor; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

Raymond W. Hill, Lieutenant, USN; B.S., U.S. Naval Academy.

Richard G. Hollenbach, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Post Graduate School.

Daniel T. Holly, Jr., Lieutenant Commander, USN; B.S., College of Idaho.

Joseph F. Hollywood, Jr., Instructor, B.A., St. John's College.

Thomas R. Irey, Ensign, USNR; B.A., Oklahoma State University.

Eldon A. Jacobs, Lieutenant Commander, USN; B.S., Northwestern Oklahoma State College; B.S.E.E., U.S. Naval Post Graduate School.

Milford A. Johnson, Jr., Lieutenant (j.g.), USNR; B.S., Kansas University.

Richard L. Johnston, Assistant Professor, B.S., Carnegie Institute of Technology; M.S., University of Maryland.

Wesley K. Kay, Associate Professor, B.S.E.E., Tufts University; M.S.E.E., University of Kentucky.

John F. Kelley, Jr., Professor; B.S., M.S., Boston College; Ph. D., Georgetown University.

Joseph H. Klein, Associate Professor, B.S., Baldwin Wallace College; M.S., University of Alabama.

William S. Kremidas, Lieutenant Commander, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

Royce L. Kriewall, Lieutenant, USN; B.S.E.E., University of Michigan.

Earle R. Laste, Jr., Assistant Professor, B.S.E.E., M.S., Northeastern University.

Paul D. Lawler, Lieutenant Commander, USN; B.S., U.S. Naval Academy; M.A., George Washington University.

John A. Lee, Jr., Professor; B.C.E., Rensselaer Polytechnic Institute; M.C.E., New York University.

Glenn E. Leydorf, Professor; B.E., University of Toledo; M.S., University of Maryland.

John E. Lowell, Commander, USN; B.S., U.S. Naval Academy.

Henry F. Maling, Jr., Professor, B.S.E.E., Northeastern University; M.S.E.E., S.D., Harvard University.

Frank L. Marek, Lieutenant, USNR; B.S.E.E., Illinois Institute of Technology.

Harrison S. Markham, Jr., Assistant Professor; B.E.E., M.E.E., Catholic University of America.

Carter V. McNeese, Lieutenant, USN; B.S., U.S. Naval Academy.

Paul J. Miller, Lieutenant, USN; B.S.E.E., U.S. Naval Academy.

Russell C. Miller, Lieutenant, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Post Graduate School.

Albert Mills, Lieutenant, USN; B.S., Central St. College (Oklahoma).

Bruce H. Morgan, Associate Professor; B.A., Harvard College; M.S., California Institute of Technology.

Roger W. Nelson, Lieutenant (j.g.), USN; B.S., University of Rochester.

Herbert M. Neustadt, Jr., Associate Professor; B.S., Massachusetts Institute of Technology; M.S., Johns Hopkins University.

David A. Nordling, Associate Professor; B.A., Georgetown College (Kentucky); M.S., Catholic University of America.

Morris M. Oldham, Associate Professor, B.A., College of Wooster; M.S., University of Michigan.

Norman A. Palermo, Lieutenant, USNR; B.S., Tulane University.

W. Donald Pennington, Associate Professor; B.S., Johns Hopkins University.

Pharo A. Phelps, Lieutenant Commander, (CEC) USN; B.S., U.S. Naval Academy; B.C.E., Rensselaer Polytechnic Institute; Ph. D., U.S. Naval Post Graduate School.

Earl R. Pinkston, Professor; B.S., U.S. Naval Academy; M.S., Catholic University of America.

William E. Pippin, Lieutenant, USN; B.S.E.E., University of California.

Paul L. Quinn, Assistant Professor; B.S., U.S. Naval Academy; M.A., George Washington University; M.S., Catholic University of America.

Dennis K. Rathbun, Lieutenant (jg.), USN; B.S.E.E., University of Southern California.

Robert R. Ressler, Associate Professor; B.S., M.S., Lehigh University.

Alan H. Rice, Lieutenant Commander, USN; B.S., University of Mississippi.

Orville W. Rollins, Associate Professor; B.S., M.S., West Virginia University.

C. Joseph Rubis, Assistant Professor; B.S.E.E., Fournier Institute of Technology; M.S., University of Illinois.

Edwin M. Rudzis, Major, USMC; B.S., U.S. Naval Academy.

Leslie R. Schweizer, Associate Professor; B.A., Gettysburg College; M.S., Virginia Polytechnic Institute.

Melvin L. Scott, Lieutenant Commander, USN; B.S., University of Colorado.

Brian T. Sheehan, Lieutenant (j.g.), USNR; B. Ch. E., M. Ch. E. Cornell University.

Don G. Sheets, Associate Professor; B.A., Central College (Missouri); M.S., Ph. D., University of Michigan.

William M. Smedley, Professor; B.S., M.S., Northwestern University.

John R. Smithson, Professor; B.S., Washington College; M.S., Indiana University; Ph. D., Catholic University of America.

Robert M. Speights, Lieutenant (j.g.), USNR; B.S., M.S., Georgia Institute of Technology.

Willard G. Steadman III, Lieutenant, USN; B.S., U.S. Naval Academy.

Terence B. Sutherland, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

Philip H. Thom, Jr., Lieutenant Commander, USN; B.S., U.S. Naval Academy.

John C. Thompson, Associate Professor; B.S., U.S. Naval Academy; M.S., Catholic University of America.

John F. Todd, Lieutenant, USN; B.S.E.E., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

Edmund J. Treacy, Commander, USN; B.S.E.E., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

Damon Wall, Assistant Professor; B.S.E.E., M.S.E.E., Mississippi State University.

John A. Ward, Lieutenant, USN; B.A., Williams College; M.S.E.E., Princeton University.

Charles G. Wheeler, Lieutenant, USN; B.S., U.S. Naval Academy; B.S.E.E., U.S. Naval Postgraduate School.

Joseph R. Wiebush, Associate Professor; B.S., Franklin-Marshall College; M.S., Ph. D., University of Maryland.

Thomas H. Wilson, Lieutenant Commander, USN; B.S., Georgia Institute of Technology.

Joseph A. Young, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

William L. Zedaker, Jr., Instructor; B.S., U.S. Naval Academy.

John G. Zimmerman, Associate Professor; B.S., M.S., University of Pennsylvania.

WEAPONS DEPARTMENT

Head of Department: William R. Werner, Captain, USN; B.S., U.S. Naval Academy; M.S.E.E., Massachusetts Institute of Technology; U.S. Naval War College; A.M.I.A., George Washington University.

Executive Officer: Richard T. Lyons, Commander, USN; B.S., U.S. Naval Academy; M.A., George Washington University.

Departmental Staff:

George G. Bailey, Commander, USN; B.N.S., Tufts College; B.S.M.E., Tufts College; M.S.E.E., U.S. Naval Postgraduate School.

Roy L. Belli, Captain, USMC; B.S., Utah State University.

Henry E. Davies, Commander, USN; B.S., Yale University.

James A. Donovan, Lieutenant Commander, USN; B.S., U.S. Naval Academy.

William B. Duncan, Major, USMC; B.S., U.S. Naval Academy; M.S.E.E., U.S. Naval Postgraduate School.

Joe D. Edwards, Lieutenant, USN; B.S., U.S. Naval Academy; M.A., George Washington University.

Edwin Z. Gabriel, Associate Professor; B.S., M.E., M.S., Newark College of Engineering.

Wallace S. Gabriel, Commander, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

Eugene D. Geiger, Lieutenant Commander, USN; B.S., Purdue University; M.S., U.S. Naval Postgraduate School.

John C. Gonzalez, Captain, USMC; B.S., U.S. Naval Academy; B.S., M.S.E.E., U.S. Naval Postgraduate School.

Donald B. Hall, Commander, USN; B.S., U.S. Naval Academy.

Estel W. Hays, Lieutenant Commander, USN; B.S., U.S. Naval Academy; M.S.E.E., U.S. Naval Postgraduate School.

Raymond W. Hine, Lieutenant, USN; B.S., U.S. Naval Academy; B.S.E.E., U.S. Naval Postgraduate School.

Frederick V. Martin, Commander, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

Russell N. McDowell, Lieutenant Commander, USN; B.S., University of Wisconsin; B.S., U.S. Naval Postgraduate School.

Justin A. Miller, Jr., Lieutenant, USN; B.S., U.S. Naval Academy.

John W. Neil, Associate Professor; B.S., State Teachers College, Calif., Pennsylvania; Ed. M., University of Pittsburgh.

William J. Ricci, Lieutenant Commander, USN; B.S., U.S. Naval Academy; B.S.A.E., U.S. Naval Postgraduate School, M.S. (Nuclear Engineering), Iowa State University.

Dwight E. Roberts, Major, USMC; B.S., Colorado State University; U.S. Naval War College.

Donald E. Rowe, Commander, USN; B.A.E., Rensselaer Polytechnic Institute; B.S., U.S. Naval Postgraduate School.

William J. Schulz, Lieutenant, USN; B.S., U.S. Naval Academy.

Charles E. Seeger, Lieutenant Commander, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

Walter J. Smith, Associate Professor; B.S., M.S. (Physics), Sc. D., Carnegie Institute of Technology.

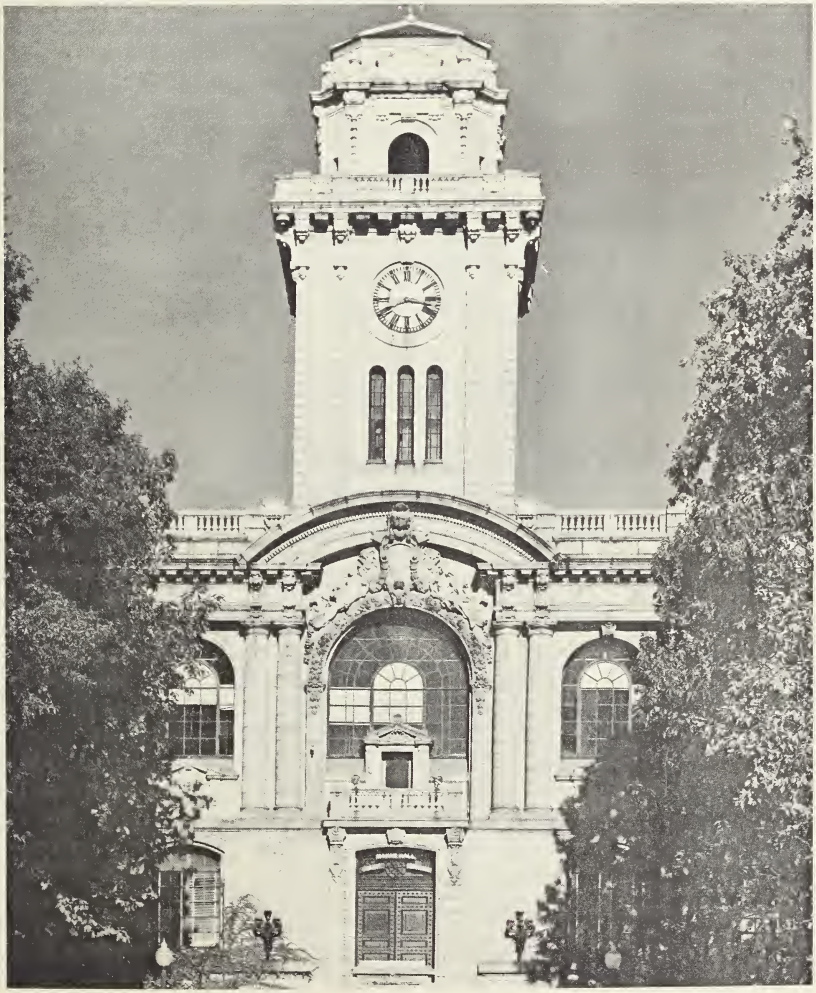
John C. Sterling, Lieutenant, USN; B.S., U.S. Naval Academy.

Dean Taylor, Jr., Commander, USN; B.S., U.S. Naval Academy, U.S. Naval Postgraduate School; Ph. D., Case Institute Technology.

Frederick W. Tindall, Lieutenant, USN; B.S., U.S. Naval Academy.

Jack H. Walker, CWO, USN.

Walter J. Wysocki, Lieutenant Commander, USN; Rice Institute; U.S. Naval Postgraduate School.



Academic Calendar 1964–1965

First Semester

28–30 August	Parents' Open House, Class of 1968.
Monday, 31 August	First term recitations begin, Fourth Class.
Tuesday, 8 September	Leave and summer training ends, First, Second, and Third Classes.
Monday, 14 September	First term recitations begin, First, Second and Third Classes.
7–11 December	Elective Enrollment Period.
Saturday, 19 December	Christmas leave begins.
Sunday, 3 January	Christmas leave ends.
Saturday, 23 January	Examinations begin.
Friday, 29 January	Examinations end.
Friday, 29 January	End-of-semester leave begins.
Sunday, 31 January	End-of-semester leave ends.

Second Semester

Monday, 1 February	Second semester begins.
Friday, 26 March	Spring leave begins.
Monday, 29 March	Spring leave ends.
10–14 May	Elective Enrollment Period.
Monday, 24 May	Examinations begin.
Saturday, 29 May	Examinations end.
Friday, 4 June	June Week begins.
Wednesday, 9 June	Graduation.

Important Dates for Candidates

1964

July 1 — The Navy Department begins officially accepting the names of candidates nominated for admission in the following year.

In this month, the U.S. Civil Service Commission holds the first of several special competitive tests for Members of Congress who utilize this means of selecting their candidates.

December 5 — Administration of College Entrance Examination Board Tests.

1965

January 9 — Administration of College Entrance Examination Board Tests.

February 1 — Closing date for the receipt of nominations of candidates.

March 6 — Administration of College Entrance Examination Board Tests.

April 22 — Bureau of Naval Personnel will notify candidates of results of College Board tests.

June 30 — Date on which qualified candidates will be authorized to report at Naval Academy for appointment as midshipmen.

Graduation—An End and a Beginning

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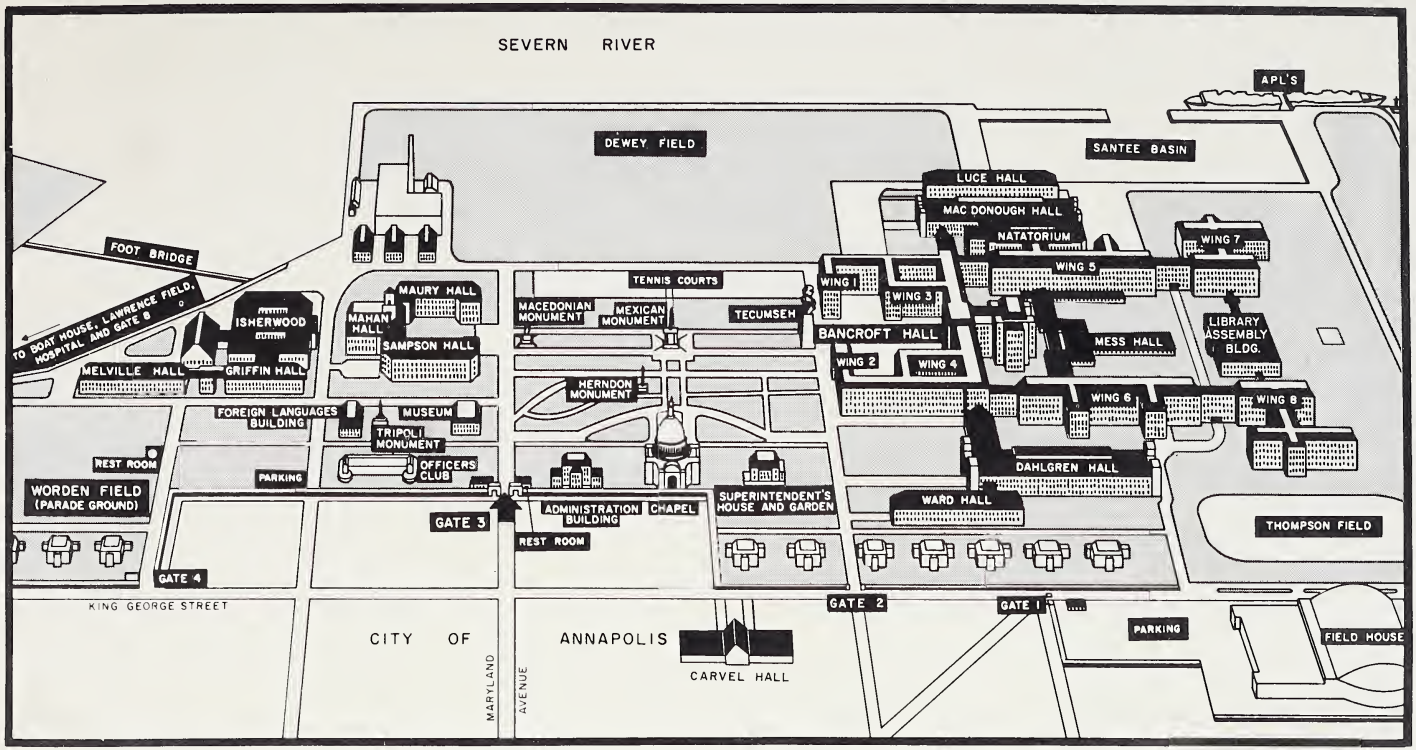
The United States Naval Academy



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